The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIV, No. 2 CHICAGO January 15, 1921

EDITORIAL DEPARTMENT—
Nathan C. Rockwood, Editor
Chas. A. Breskin, Assistant Editor

BUSINESS DEPARTMENT—
Geo. P. Miller, Manager.

EASTERN OFFICE—
Chas. H. Fuller, Manager, 101 West 41st Street, New York City, N. Y.

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W. D. Callender, President.
N. C. Rockwood, Vice-President.
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TABLE OF CONTENTS

FEATURE ARTICLES

DEPARTMENTS

For Index to Advertisements See Page 83

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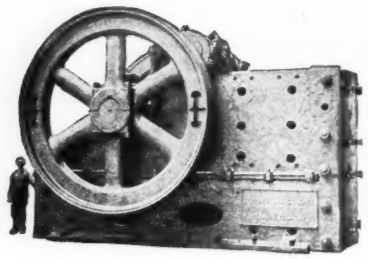
DEPARTMENTS

For Index to Advertisements See Page 83



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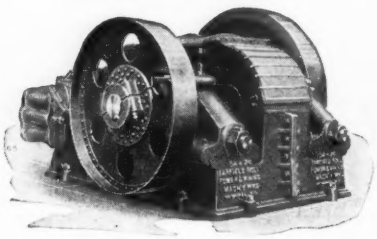

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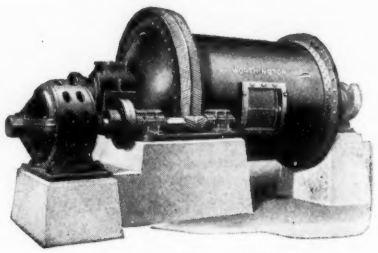

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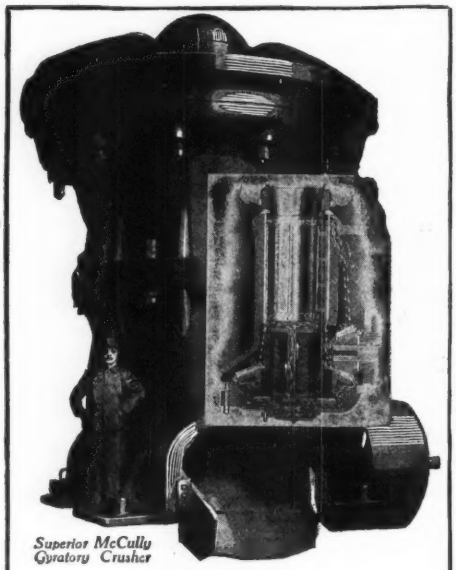

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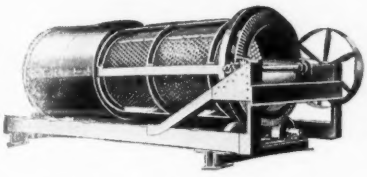

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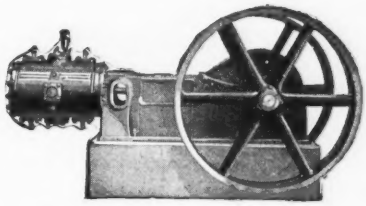

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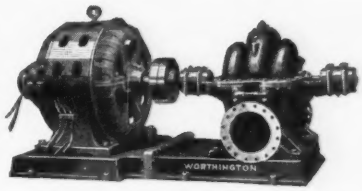

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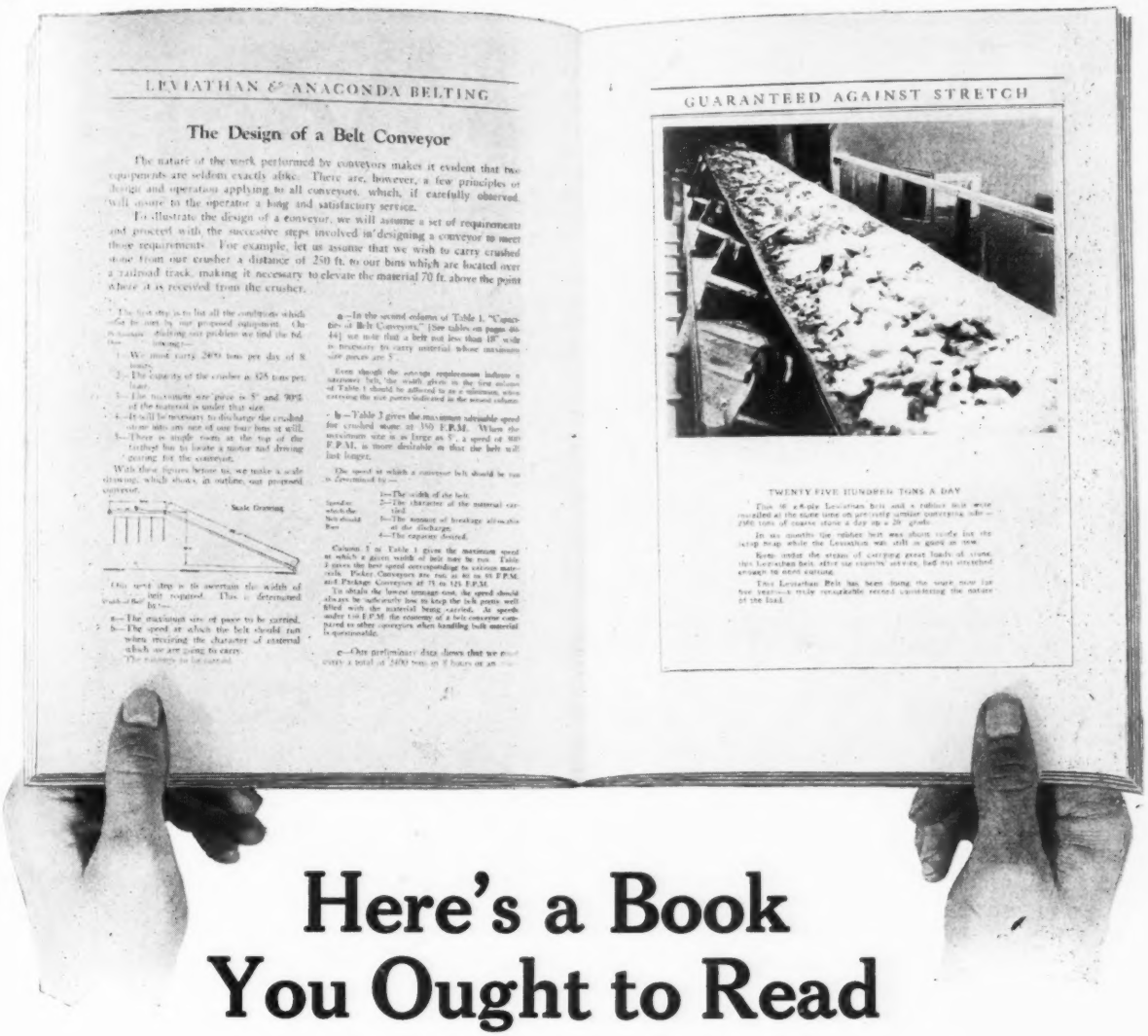

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It is illustrated by many notable examples of scientific belt conveying as developed by Engineers of authority, and includes discussions on capacities, speeds, power requirements, maintenance costs, troughing angles; flat, troughing and guide rollers, mechanical feeders, discharging devices, etc.

Incidentally, it also explains the many advantages of Leviathan and Anaconda Belts and Main Belting Rollers for this class of work.

Regardless of your present opinions on these subjects, you should read this booklet and we will be pleased to send you a free copy upon request. Also another book on "Power Transmission" if you desire.

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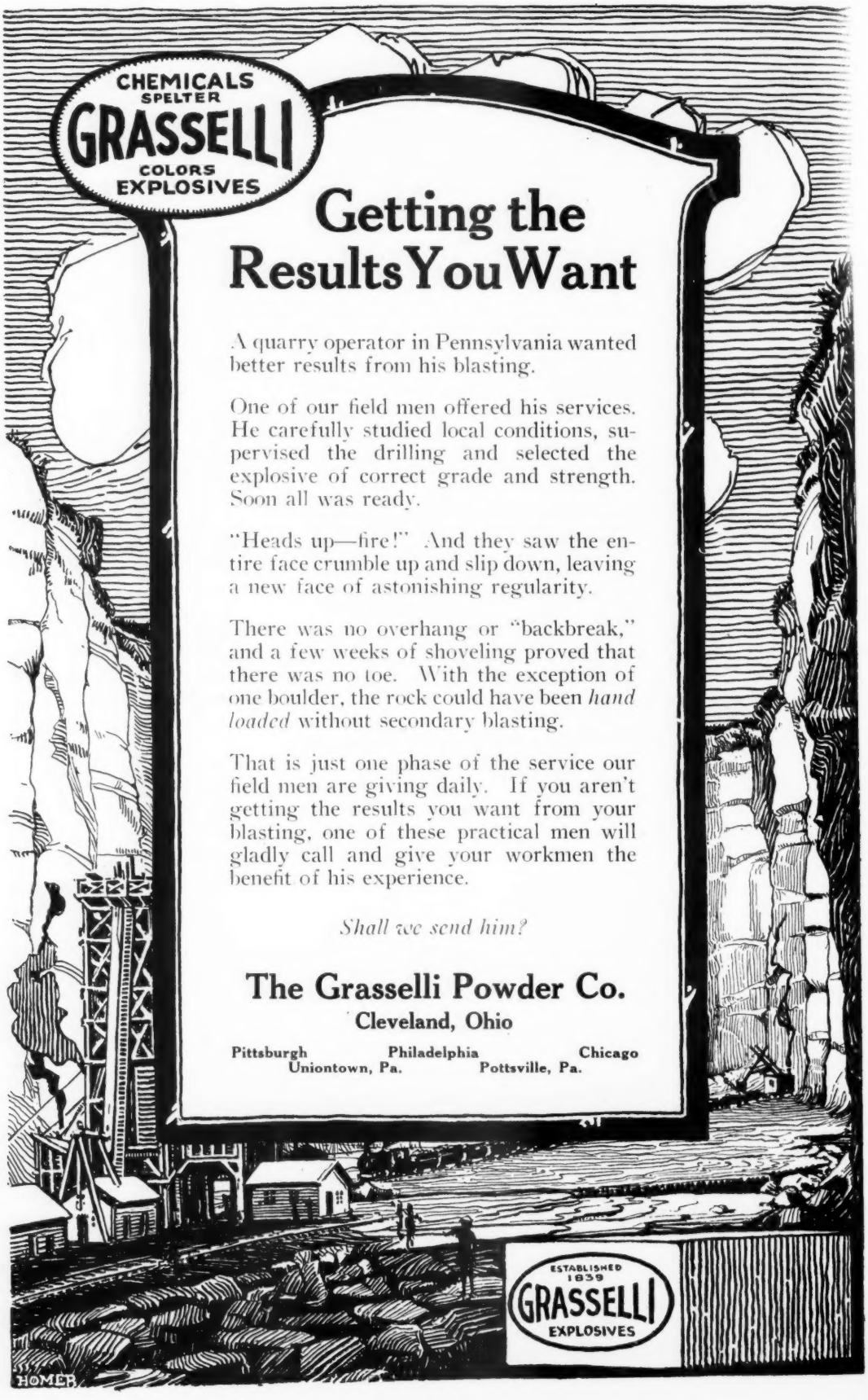
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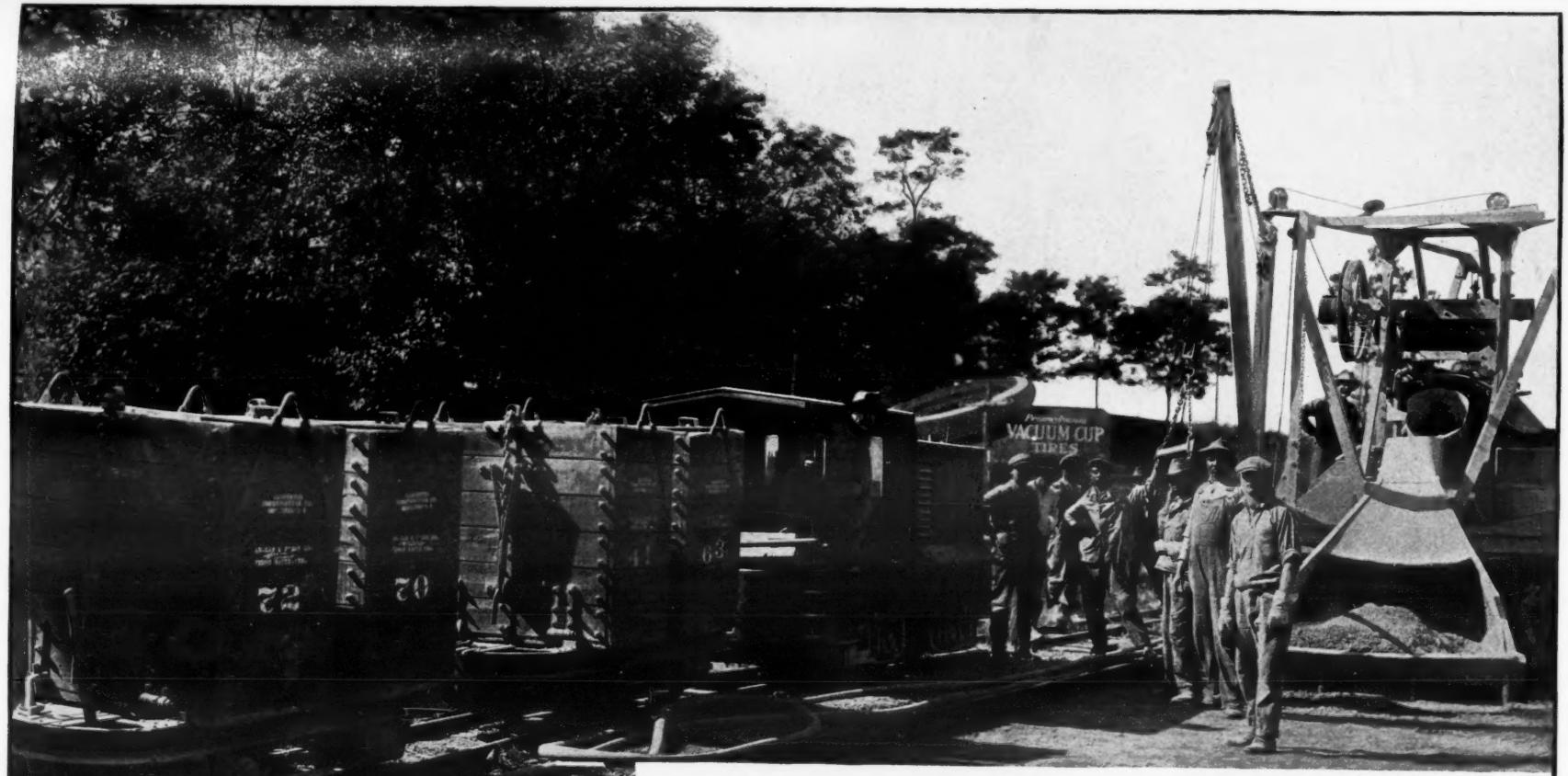


Pins Faith to Plymouth Locomotives

Three six-ton Plymouth Locomotives were a part of the equipment of The Carpenter Construction Co., used in the construction of cement highway on the old National Road at Seeleyville, Indiana, connecting Terre Haute and Indianapolis.

Supt. Harry Gladhart, in the foreground, says the Plymouth Locomotives were always in commission and delivered materials in quantities that kept everyone moving. Especially was he pleased at the low up-keep. What a saving in time and money when materials are moving and there are no stops to disorganize the man power.

That's why Mr. Gladhart remarked: "Our faith is pinned to the Plymouth."

THE FATE-ROOT-HEATH CO., PLYMOUTH, OHIO

Rock Products

Vol. XXIV Chicago, January 15, 1921 No. 2

Granulated Slate Industry of New York and Vermont

A Peculiarly American Quarry and Crushing-Plant Development—Waste Product —Relation to Slate Shingle Industry

ABOUT TEN OR MORE YEARS ago some one conceived the idea of giving tar paper or asphalt composition roofing a wearing surface of slate, slate having been demonstrated by many centuries of use to be a most excellent roofing material. Of course long previous to that time similar roofing surfaced with pebbles was common, particularly for flat roofs.

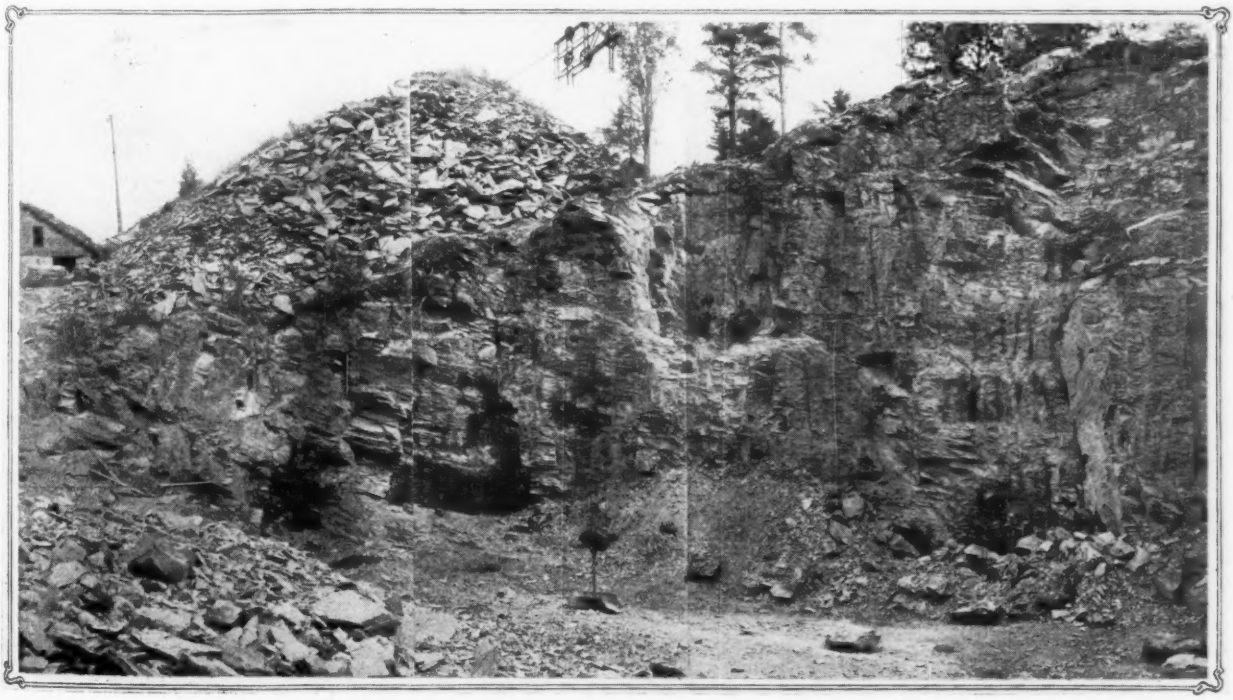
The slate used for this purpose is in the form of small chips, or granules, and the credit for first producing a slate quarry product for this purpose apparently belongs to the Staso Milling Co. of Poultney, Vt. This company obtained patents covering the use of crushed or granulated slate for a variety of purposes, including its use for roofing; and on the basis of these patents has licensed various prepared roofing manufacturers.

Left, Fred H. Ellis, general manager of the Vermont Milling Products Co.; right, A. C. Freeborn, general manager of the Vermarco Lime Co.

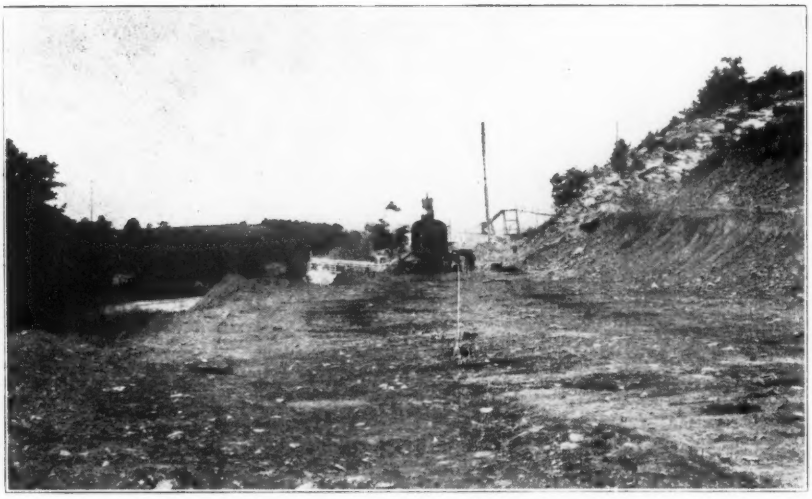
The great popularity of this kind of roofing material, developed during and since the war, created a large demand for the slate granules and consequently has developed a very considerable industry for their production in the Vermont and New York slate quarry section, over which the Staso Milling Co. no longer has any control. The patents covering the use of slate granules for this purpose are now in litigation in the United States courts, but this has not deterred many new producers of slate granules from entering the field during the last two years.

Vermont Milling Products Co.

By far the largest enterprise in the slate



Typical Vermont slate quarry operated for a "granule" plant



Stripping quarry of the Vermont Milling Products Co.

Old plant of the Vermont Milling Products Co.

Near view of the original plant from new quarry level

granule industry is the Vermont Milling Products Co., whose plant is at Fair Haven, Vt. This company began quarrying and crushing slate with a small plant about two years ago, and during 1920 constructed by far the largest mill in the industry, besides acquiring real estate and quarry property for a much larger plant.

This operation is of particular interest because it is the only slate-quarry in the country possibly in which blasting and rock handling are carried out on a scale comparable to big quarry operations in limestone. The slate ledge is stripped and the broken slate loaded by 80-ton steam shovels. The initial crusher is a No. 10 K Gates gyratory, being by far the largest crusher in the slate industry.

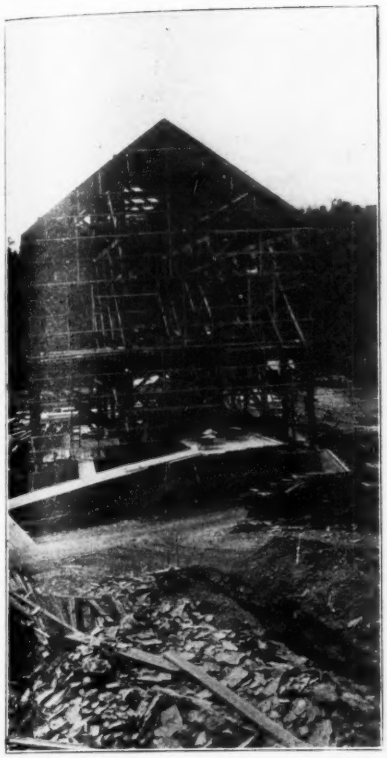
Crushing Plant

The initial crusher is placed on the rim of the quarry ledge where trains of slate rock from the shovels dump into it from either direction. From the initial crusher the slate is carried up by an inclined belt conveyor to the main part of the plant, where the material first passes a scalping screen, the rejections going to a smaller gyratory.

The material passing the scalping screen goes through two 48-in. disk crushers and then through four successive batteries of smooth-faced roll crushers. After passing each battery or set of rolls the material is conveyed to sets of Newago screens, where the fines and the finished sizes are removed and only the oversize continues to the next set of roll crushers. The capacity of this plant is about 600 tons of finished product per day.

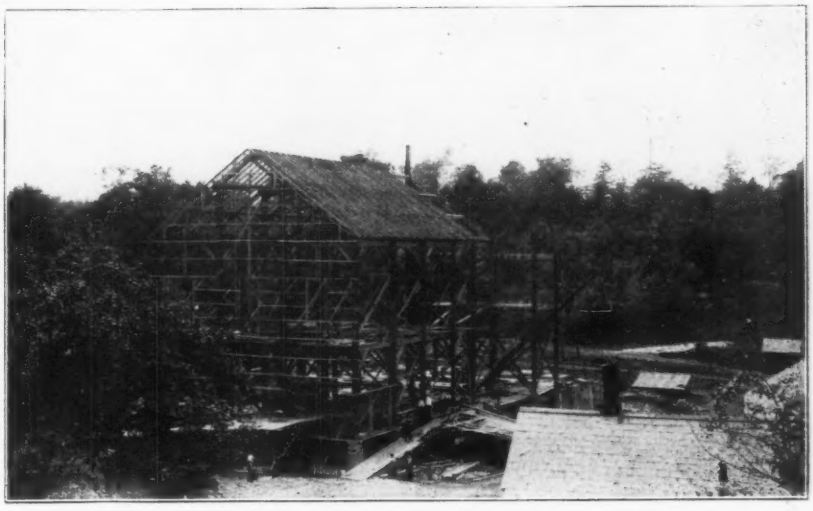
The finished product is a material composed chiefly of pieces between 10-mesh and 20-mesh in size, but absolutely clean and free from dust. This is stored in concrete bins and handled and loaded in bulk by means of gravity chutes. At the plant just referred to the product is made from sea-green slate. Red slate is also much in demand for the same purpose.

The plant of the Vermont Milling Products Co. was not completed at the time it was visited by the editor last fall. Consequently complete details are lacking. It was designed under the supervision of Fred E. Ellis, general manager of the company, who is well known to crushed stone men as the president of the Essex Trap Rock and Construction Co., Peabody, Mass. The details were arranged and most of the crushing and screening equipment furnished by the Sturtevant Mill Co., Boston, Mass. The officers of the Vermont Milling Products Co., besides Mr. Ellis, are Charles G. Bancroft, president; H. Norton Hill, vice-president, and Stowell H. Bancroft, treasurer. Mr. Ellis had entire charge of construction; and the erection details, as regarding machinery and equipment handling, labor handling, housing, etc., were models of up-to-date contracting methods.

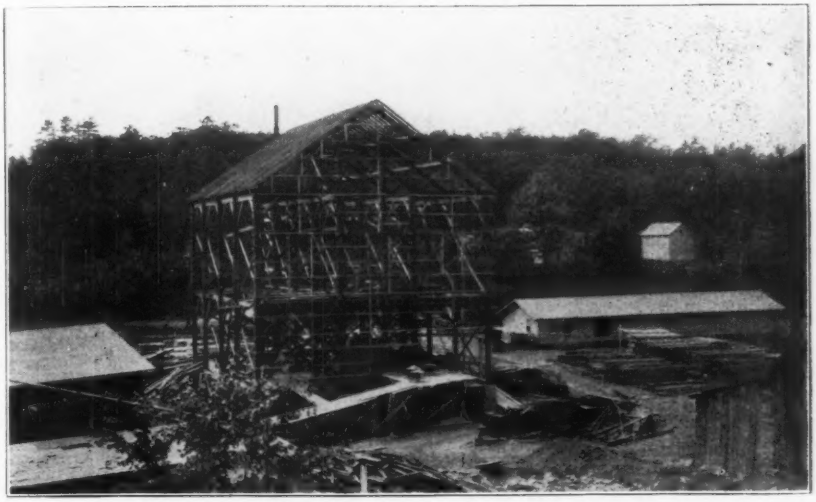


New plant of the Vermont Milling Products Co. under construction

Largest crusher in the slate industry ready for erection



Plant of the Vermont Milling Products Co. under construction



Another construction view taken from initial crusher location

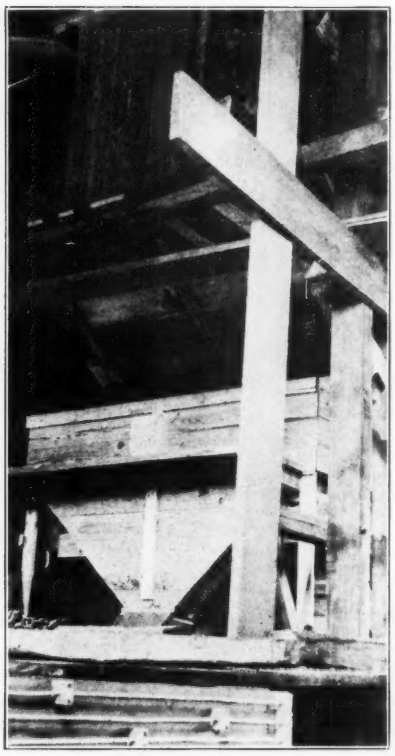
Red and Green Granule Slate Products Co.

While the Vermont Milling Products Co. is the largest operation of its kind a more typical one (because it is smaller) is that of the Red and Green Granule Slate Products Co. at Granville, N. Y. This plant has about half of the capacity of the first one described, and there are a considerable number of other plants of about the same size.

At the Granville plant the slate is quarried by hand methods, loaded in cableway skips and thus conveyed to and dumped into the initial crusher, which in this case is a No. 5 gyratory, at the quarry end of the crushing plant.

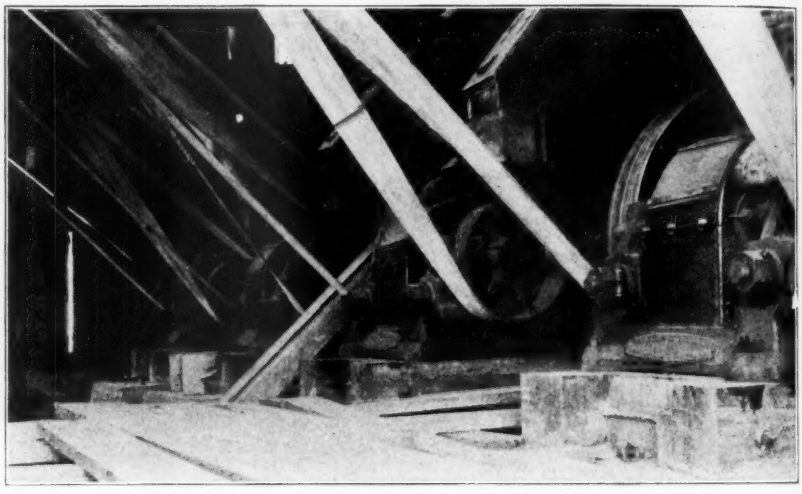
The product of the No. 5 crusher goes by elevator through a 36-in. disk crusher and then to a shaker scalping screen mounted over a 300-ton storage bin. The shaker screen passes every thing that will go through a ¼-in. mesh, the rejections going off the end of the screen by a gravity chute, which feeds a pair of 16x36-in. smooth faced roll crushers.

The ¼-in. material and smaller is fed out of the 300-ton bin to an elevator, where it is joined by the product of the roll crushers, which leads to a pair of Mitchell electric vibrating screens. These screens take out the finished granules, the dust being taken away by a belt conveyor and wasted, while the screen rejections are chuted to a battery of three 14x36-in. roll crushers.

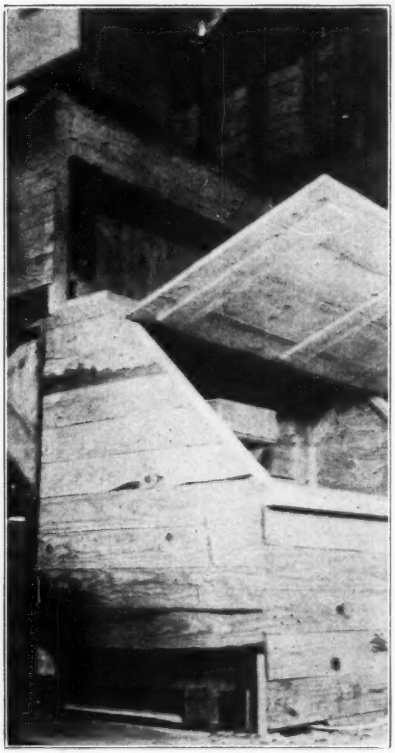


Mitchell screens in series

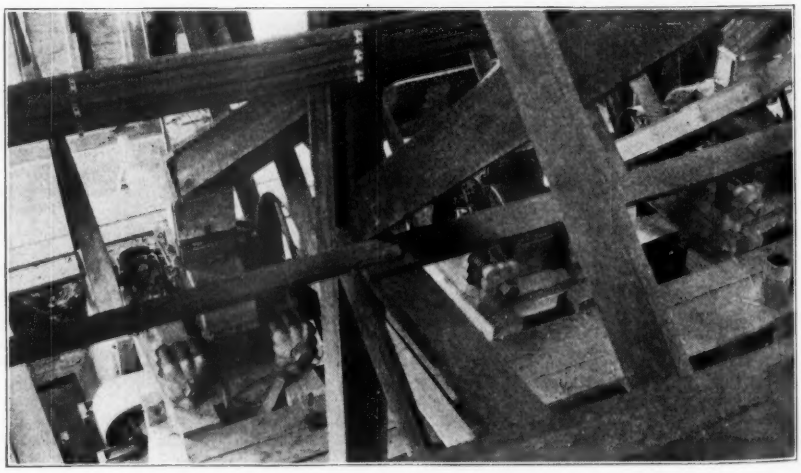
Plant of the Red and Green Slate Granule Products Co.



Battery of four smooth-faced roll crushers



Another view of the Mitchell screens at the plant of the Red and Green Slate Granule Products Co.



Looking down from screen loft on battery of roll crushers

The output of these rolls is elevated to a second pair of Mitchell screens where the same process is repeated, the rejections of these screens being chuted back to a fourth 14x36-in. roll crusher, which is placed in line with the other three mentioned. From this roll crusher the material returns to the same screens.

This plant was designed and most of the equipment furnished by Chalmers and Williams, Chicago. The officers of the Red and Green Granule Slate Products Co. are W. F. Conner, president; C. W. Roome, treasurer and general manager, and Thos. F. Dunn, superintendent.

General Observations on the Industry

The problem of the slate granule industry is to produce uniformly sized product (10- to 20-mesh) with the least possible production of fines or dust. The best method of accomplishing this, as developed by experience in many operations, is by crushing in stages and removing the fines after each stage.

The first stage is the gyratory crusher, crushing to 2-in. or 3-in. The secondary disk crushers or rolls reduce this product to ½-in. or ¾-in., with a large proportion reduced to ¼-in. and less. Consequently between this stage and the third it is necessary to remove the fines and the finished sizes, or the effect of the subsequent crushing rolls would be to greatly increase the production of fines.

In other words exactly the reverse of the ordinary process of crushing is desired, i.e., the minimum instead of the maximum amount of fines. The crushing may be continued, as at the plant of the Vermont Milling Products Co., through six or eight stages in order to uniformly distribute the load on the various rolls and develop their maximum capacity.

Great Waste From Fines

Even with the most approved practice the slate apparently can not be reduced from quarry stone to granules without the waste of about 40 per cent of the material as fines, or dust. At the present time this is not only worthless but obviously presents a considerable problem in its disposal.

The most feasible method of disposal is to convey the dust from the screens to a hopper or flume where water is added and the mixture allowed to flow away to any low spot on the quarry property. The addition of the water has two objects, one to convey the material as noted, and the other, and possibly the more important one, is to keep the dust out of the atmosphere.

The mills of the Staso Milling Co., the Vermont Milling Products Co., and possibly others are equipped with dust-collecting systems in their interiors. The Staso Milling Co. precipitates and collects this dust by means of Cottrell electrical precipitators, while the Vermont Milling Co. uses the ordinary cyclone collectors.

This Vermont slate is said to analyze nearly 80 per cent silica. Consequently it is extremely unhealthful stuff to breathe and unquestionably all slate-granule manufacturing plants will eventually be compelled to protect their workmen by installation of dust-collecting apparatus.

Uses of Dust

Of course a great deal of thought has been given to the problem of utilizing this dust in some manner, which would obviously very materially reduce the cost of producing the slate granules. It could be used in the manufacture of portland cement as it is chiefly an alummum silicate. There is lots of limestone in this vicinity, but it is generally conceded to be too far removed from the coal fields to offer very rosy prospects for cement manufacture. However, this is an opinion that has possibly not been thoroughly investigated.

It would be very simple to flume the slate dust and water direct to slurry tanks where pulverized limestone and water could be added and mixed with it to complete the cement slurry proportion.

It is also believed by some that the pulverized slate is a good enough sand to manufacture sand-lime brick. As there is plenty of high calcium limestone near at hand this would, if experience justifies, undoubtedly prove a feasible method of utilizing the waste product.

Whether the slate dust is sufficiently high in silica to make sand-lime brick or not, it is unquestionably good enough sand to make cement brick, if some of the fines were screened out; but this would still involve considerable waste.

It is said to be possible to make a burned clay brick of the material, but that the cost is too high to make this process a commercial success.

Plant of Staso Milling Co. before installation of Cottrell electrical precipitators

Plant of the Staso Milling Co. after the Cottrell electrical precipitators were working

As in the development of the slate-granule industry, the Staso Milling Co. has also taken a leading part in the development of the use of the waste product. This company has converted considerable quantities of its *red* slate dust into paint pigment and has also done some experimental work in brick making. Some is sold for mineral filler in linoleum and other products.

As Side Line of Slate Shingle Industry

As has already been pointed in a previous article on the slate-quarry industry, the production of slate shingles also involves the waste of a large percentage of the quarry stone. Of course the question immediately comes up whether or not slate granules can not be made cheapest from these waste products of the shingle industry. The apparent answer is no.

It would cost about as much to excavate the old waste slate piles, clean and convey the material to a crushing plant as it does to quarry the stone direct. It might be possible to pass the material on from a slate-shingle quarry to a crushing plant without going to a waste pile, but this would very likely involve so much rehandling that the cost of the waste product at the crusher would be more than the cost of the quarry stone.

Nearly all the slate-shingle quarries of this vicinity use hand quarrying methods and it is obvious that big steam-shovel operations like that of the Vermont Milling Products Co. will eventually set the price at which the material can be sold at a profit.

However, while the slate granule industry as a side line of the shingle industry may not look promising at this time, there is no telling what improved quarrying and handling methods in the slate-shingle industry might make possible in the development of the slate granule industry.

Just now, unfortunately, the slate-shingle man is inclined to view the slate-granule business as a fresh young upstart with which he wants absolutely nothing to do. Nevertheless there seems no real reason why the two could not be co-ordinated to the economical operating advantages of both.

National Agricultural Limestone Association

Reorganization of Association to Expand Activities—Railway Co-operation

THE PRINCIPAL TOPICS DISCUSSED at the annual meeting of the National Agricultural Limestone Association at Columbus, Ohio, Jan. 11 and 12, were the reorganization of the Association, the drafting of a new constitution, and co-operation with the railways to expedite agricultural limestone shipments.

Ohio Meeting

The proposed Ohio division of the National Agricultural Limestone Association met on Jan. 11 at Columbus to consider the adoption of a constitution suitable to the needs of that division. Clyde Calvin of the Bessemer Limestone and Cement Co., Bessemer, Pa., was elected temporary chairman of the meeting, and a general discussion followed as to the advisability of adopting such a constitution.

H. E. Bair, of the France Stone Co., Toledo, O., appeared as spokesman for the Indiana division, and told of the progress made by the recently formed agricultural limestone division of the Indiana Crushed Stone Association. He said that the Indiana division would pay dues in proportion to their tonnage, and would expect service in proportion to the amount of money paid in. The Indiana division will have no paid officers, but will merely be a group to discuss local problems, and the employment of a field man to co-operate with state agricultural authorities in extending the use of agricultural limestone among farmers would be entirely at their discretion. Mr. Bair suggested a similar policy for the proposed Ohio division, and asked that the committee which drew up the constitution for that division be continued and instructed to change the constitution so as to enable any group or division to come

A. P. Sandles, secretary, National Agricultural Limestone Association

in the Association. In other words, the groups or divisions will have no constitutions, and will only be social affairs, the members of such groups paying their dues direct to the National Association. All members will get the literature of the Association but the field service will be apportioned to the amount of money paid in. After considerable discussion Mr. Bair's suggestions were adopted, and the constitutional committee was instructed to prepare a new draft for consideration at the National meeting on Jan. 12.

Prof. Firman E. Bear, chief of the soils department, college of agriculture, Ohio State University, requested that members of the Association send him confidential reports of the amount of agricultural limestone sold by them during 1920, so as to enable him to compile and publish records of the amount of agricultural limestone used in each county in the state of Ohio. The same information was to be asked of the producers of agricultural lime, and in this way Prof. Bear will be able to show by totals toward which product there is a greater tendency. The Association promised Prof. Bear their utmost co-operation.

Prof. Bear, in reviewing the proposed National Lime Law, stated that in his opinion the lime and limestone interests should not clash; that the general tendency was toward agricultural limestone and that the best possible thing to do was to let the whole matter take its own course.

Railway Co-operation

W. H. Hill, agricultural agent, New York Central Lines, outlined to the Association just what the railroads proposed to do in order to stimulate the use of agricultural limestone. He stated that the New York Central Lines were willing to lease ground on their right-of-way for a very nominal rent in order that agricultural limestone storages be created. This

will tend to increase the sale of the product by eliminating the farmer's difficulty in getting the material from the car to the farm, for with the creation of a storage the farmer could haul it to his farm at his own convenience. It would also decrease the long hauls, and making the product convenient to the farmer would certainly increase its use. A movement such as outlined above would be of great value to the railroads for it would supply them with tonnage in the off-season. The Association voted its hearty co-operation to Mr. Hill and appointed a committee to confer with him on the matter. Mr. Hill also stated that the Erie R. R., Chicago, Burlington and Quincy R. R., Chicago and Eastern Ill. R. R., and the Southern R. R., thought favorably of this work, and would undoubtedly also fall in line.

National Meeting

The annual meeting was held on Jan. 12, the day following the preliminary Ohio meeting, and was opened by President F. R. Kanengeiser, who very briefly reviewed the year's work, besides explaining what took place at the Ohio meeting. Pres. Kanengeiser was followed by C. R. Wagner, field representative of the National Agricultural Limestone Association who presented his annual report to the Association, which is printed elsewhere in this issue.

W. H. Hoagland, general manager of the Marble Cliff Quarries Co., Columbus, O., made a very interesting talk on the period of readjustment that the country is now going through. He showed quite conclusively that the price of crushed stone and agricultural limestone was never in balance with other commodities, but instead it was much lower, for they never received anything but a fair profit, with which they were perfectly satisfied.

The matter of co-operating with the railroads in helping to expedite agricultural limestone shipments by establishing storages along the railroad's right-of-way was again taken up, and C. R. Wagner was appointed to confer and assist W. H. Hill, agricultural agent, New York Central Lines, in working out a possible plan.

The constitutional committee presented their new constitution before the Association, which was read section by section, and discussed and adopted in the same manner, the final form being as presented below. It was then adopted as a whole which automatically threw out the old constitution.

Constitution of the National Agricultural Limestone Association

ARTICLE 1

The name of this Association shall be The National Agricultural Limestone Association. It shall be an Association operating without profit. Its headquarters or principal office shall be at a place designated by the board of directors.

Article 2—OBJECTS

Section 1.—The objects of this Association shall be to establish standards of production and quality, to promote, urge and increase the use of agricultural limestone or any carbonate form of lime.

Section 2.—To co-operate with Agricultural Colleges, Experimental Stations, Farm Bureaus, County Agents, Consumers, Producers and other agencies in promoting the welfare of the farming industry and to place the agricultural limestone industry upon such a broad and sound basis as will best serve the interests of the public.

ARTICLE 3—MEMBERS

Section 1.—Any corporation, firm or individual; or association of corporations, firms or individuals, interested or engaged in the production of limestone or any carbonate form of lime for agricultural purposes, is eligible to membership. Membership shall be of three classes, viz.

Class 1. Corporation, firm or individual.

Class 2. Association of corporations, firms or individuals.

Class 3. Associate members.

Section 2.—1. All Class 1 members shall be entitled to one vote.

2. Each member of class 2 shall be entitled to one vote.

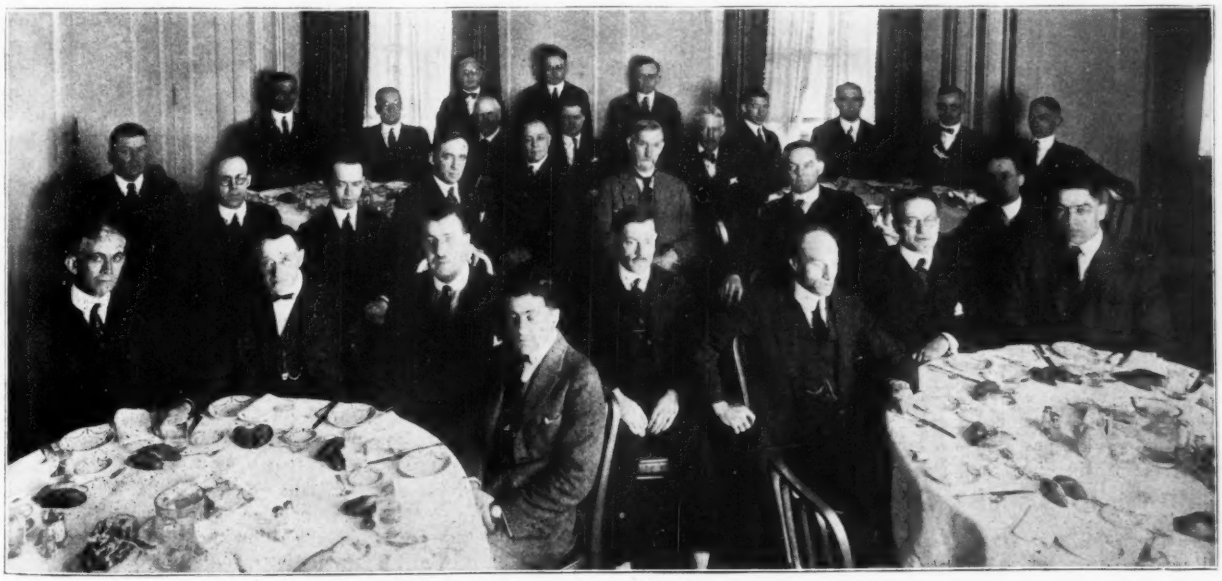
Section 3.—The Board of Directors shall have the right to terminate at any time the membership of any member who may misuse the rights and benefits of this Association.

Section 4.—Any member may terminate membership at the end of any calender year by giving 60 days' notice in writing to the secretary.

Section 5.—The funds to maintain this Association shall be assessed as follows:

Class 1. By assessment not to exceed five cents (5 cents) per net ton on all shipments made during preceding year. Such assessments to be made in quarterly payments when called for by the Board of Directors as needed. Minimum assessment $25.00, maximum $1,200.00. Minimum assessments payable in advance.

Class 2. Any Association as a member composed of separate corporations, firms or individuals shall be assessed not to exceed five cents (5 cents) per net ton on all shipments made during preceding year for each member of this Association. Such assessments to be made in quarterly payments when called for by the Board



Annual banquet, National Agricultural Limestone Association

of Directors as needed. Minimum assessment $25.00, maximum $1,200.00, for each member of such Association. Minimum assessments payable in advance. Such Association shall collect such assessments from its members and remit same to The National Agricultural Limestone Association.

Class 3. Associate membership dues shall be determined by the Board of Directors.

Section 6.—No obligation in excess of $100.00 shall be incurred against this Association by its officers without authorization of its Board of Directors.

Section 7.—The Board of Directors shall apportion field service of this organization in such a manner as to give each member his fair proportion thereof.

Section 8.—Application for membership shall be made on the following printed form.

Section 9.—

APPLICATION FORM
THE NATIONAL AGRICULTURAL LIMESTONE ASSOCIATION
COLUMBUS, OHIO

Gentlemen:

The undersigned hereby makes application for membership in your Association. We have read the Constitution, and if accepted as a member, hereby agree to comply and be governed by the conditions named therein.

Date..... Signed.....

Address..... By.....

Under receipt of such application for membership it shall be presented and acted upon at the next meeting of the Board of Directors.

ARTICLE 4—OFFICERS

Section 1.—Eleven Directors shall be elected at the annual meeting and shall hold office for one year or until their successors have been elected and qualified.

Section 2.—Immediately following the annual meeting the Directors shall meet, qualify and organize by electing from their number a president, vice-president and treasurer. A secretary shall be selected by the Board of Directors for one year at such salary as may be agreed upon.

Section 3.—The Board of Directors may call meetings to fill vacancies, employ assistants necessary to accomplish the objects of and perform the duties of this Association.

Section 4.—A majority of the Board shall constitute a quorum.

Section 5.—The secretary shall keep minutes of meetings, make reports, receive all monies, pay same to treasurer, take receipt therefor, and perform all duties prescribed by the Board of Directors.

Section 6.—The treasurer shall receive all monies from the secretary, and pay warrants, authorized by the Board of Directors and signed by president and secretary. The treasurer shall furnish surety bond in such amount as may be determined by the Board of Directors; the premium thereon to be paid by this Association.

ARTICLE 5—MEETINGS

Section 1.—The annual meeting of this Association shall be held the second Tuesday of January, 10 A. M., Central Standard Time, at such location as designated by the Board of Directors.

Section 2.—Special meetings may be called by the president or Board of Directors or shall be called on the written request of three or more members, presented to the secretary.

Section 3.—Notice of meetings shall be mailed to members at least five days previous to meetings.

ARTICLE 6

All limestone and other forms of carbonate of lime products produced for agricultural purposes by members of this Association must conform to the laws of the State in which delivery is made.

ARTICLE 7—FREEDOM OF TRADE

No member of this Association shall enter any agreement to restrain trade, limit competition or do any act contrary to law, or the objects of this Association.

ARTICLE 8—PUBLICITY

Records of this Association shall be open to members and to the public.

ARTICLE 9—AMENDMENTS

Amends to these Articles may be proposed at any regular or special meeting of the Association. Due notice of such amendments shall be given in writing to each member at least 30 days in advance of the meeting at which such amendments are to be voted upon, and an amendment to be adopted must receive the affirmative vote of at least two-thirds of the members present.

New Officers

As provided for in the new constitution the following were unanimously elected to serve on the Board of Directors: A. B. Meyer, Mid-West Quarries Co., Indianapolis, Ind.; Harry Brandon, Ohio Marble Co., Piqua, O.; A. N. Spencer, Spencer-Whitlow Co., Columbia, Mo.; H. M. Hindes, Solvay Process Co., Detroit, Mich.; O. H. Binns, Casparis Stone Co., Kenneth, Ind.; A. P. McCallie, Kelley Island Lime and Transport Co., Cleveland, O.; J. C. King, Carbon Limestone Co., Youngstown, O.; Clyde Calvin, Bessemer Limestone and Cement Co., Youngstown, O.; H. E. Baer, France Stone Co., Toledo, O.; W. H. Hoagland, Marble Cliff Quarries Co., Columbus, O., and R. J. Fuller, Columbia Products Co., Cleveland, O.

The following were elected as officers for the year of 1921: President, Clyde Calvin, Bessemer Limestone and Cement Co., Youngstown, O.; vice-president, A. B Meyer, Mid-West Quarries Co., Indianapolis, Ind.; treasurer, W. H. Hoagland, Marble Cliff Quarries Co., Columbus, O.; secretary, A. P. Sandles, Columbus, O.; Chairman, Board of Directors, Harry Brandon, Ohio Marble Co., Piqua, O.

Annual Banquet

The annual banquet of the Association was held at the Deshler Hotel. One of the distinguished guests present at this banquet was Dr. Chas. E. Thorne, director; Wooster Agricultural Experiment Station, State of Ohio. Dr. Thorne gave a very interesting and instructive talk on his work at Wooster, and enlightened many of the members present as to the requirements of agricultural limestone and when and how it should be best used.

New Rock Testing Machine at Wisconsin University

FOR STUDYING the changes in rock caused by great pressure and heat far below the surface of the earth the department of geology of the University of Wisconsin has acquired a compression testing machine capable of exerting a pressure of 400,000 pounds.

The machine will be used on various research problems in structural and metamorphic geology involving the behavior of rocks under great pressure similar to the pressure exerted many miles under the earth's surface. Deep within the earth the pressures are very great because of the weight of overlying earth and rock and the temperatures increase with depth. The new testing machine will be equipped to maintain automatically a constant pressure over a long period of time. Means for heating the materials while they are under pressure and for maintaining constant temperature and accurately measuring temperatures are also provided. With the high pressure of which the machine is capable, the university geologists and graduate students in geology will be able to reproduce in the laboratory some of the alterations in composition of various rocks and will be able to learn much about the changes that take place deep within the earth.

The enormous pressure of the machine is developed by means of a hydraulic press in which oil is used. The oil is contained in two connecting cylinders, one of small diameter and the other much larger in diameter, and the oil in the small cylinder is subjected to pressure by means of a piston. This pressure is transmitted to the large cylinder and therefore the total pressure is multiplied in a ratio of the area of the small cylinder to the area of the large cylinder.

The machine was acquired through funds given for the purpose by W. A. Clark, of Butte, Mont., who has extensive mining interests in copper, zinc and silver in the West.

Legality of Price Reporting by Trade Associations

Open-Price System of Competition Again Under Fire in Courts and Elsewhere

MUCH SPACE in New York City newspapers is now being devoted to the legislative investigation of the allged "building material trust" and all building material associations are coming within its scope. The Portland Cement Association in particular is enjoying a great deal of notoriety.

Of course every business man knows that such investigations as this one are chiefly political fireworks to satisfy that strange craving for a certain kind of morbid enjoyment that nearly every human being seems to have. In the good old days leaders and rulers used to satisfy this craving by burning at the stake or drawing and quartering unfortunate individuals whose acts furnished an excuse for such exhibitions. In our time physical suffering and death are replaced by a kind of battle of wits, in which the publicly accused is naturally at a great disadvantage.

The Rock Products Industry

Without attempting to pass on the merits of this particular case, of which we know little, the general proposition is this: Rock products producers are accused of earning a *profit* and saving themselves and the industry from bankruptcy by the only means they can possibly accomplish this end—by knowing enough about their competitors' business and the conditions in the industry as a whole to run their own particular business intelligently.

Under the law it is just and proper for labor unions to combine and put up the price of labor to the highest possible notch economical conditions will stand. It is just and proper for farmers to combine to keep up the price of wheat, milk, eggs, or what not. But under the same law it is criminal for producers or manufacturers of anything but labor or farm products to even protect themselves.

There is no law to prevent a man coming to you and saying: "Jones has offered me cement at $2 per bbl., if you will cut that price 10 cents I will give you an order for 100,000 bbl." If you, Smith, and your competitor, Jones, exchange quotations through a trade association, so that you can check up the statement made by your prospective purchaser and save yourself from selling him cement at $1.90 per bbl. that would have cost him $2.50 per bbl. at your competitor's, why then you lay yourself open to a legislative investigation and possible criminal prosecution.

The Open-Price System

The introduction of the so-called open-price system of competition, in which the prices actually received on different contracts by various members of an association become the common property of the association, must necessarily result in the operation of their business *at a profit,* for a man would be a fool to continuously sell his product for a great deal less than what he knew to be a fair market value. At the same time we know that the majority of the people in all walks of life are honest and honorable, or we wouldn't be able to have a stable government. So in every trade association there are certainly some who will be satisfied with a *fair profit,* and consequently the limits to which the others can go are fixed.

In an industry like those in the rock products field where the raw materials are lying around loose on every side, it would certainly be the height of business folly to make an *unfair profit* in any way whatsoever, because it is only inviting new competition and threatening the industry with overproduction and all the accompanying economic ills.

Nobody can deny that the open-price system, or the exchange of prices between producers, *may* result in excessive prices and consequently in a violation of the law. On the other hand it need not necessarily result in excessive prices, and in itself is no more of a violation of the law than the practice of merchants in tagging the prices on the goods they display for sale.

In the New York investigation a great point is made of the alleged uniformity of cement prices. There is nothing at all remarkable or criminal in this. With a product so well standardized as portland cement there is no reason why the cost of manufacture should not be fairly uniform. The fellow with the extremely low costs is fully as apt to be the one who has left out something and is kidding himself as the one who really has an efficient operation. So if costs are fairly uniform, selling prices must of necessity also be fairly uniform.

The Moral

A business, or a corporation, which is run at a loss, or fails to earn a fair profit, is a charge and a burden on the industry, on society and on the nation, just as much as a pauper or an imbecile individual is a burden on society. But the latter is a necessary evil, under our present civilization, while the former is not.

This truth is so fundamental and so obvious that it cannot be avoided by legislative investigating committees or anywhere else. Consequently so long as your prices can be defended as *fair* you need have no fear of the outcome of these investigations, legal or otherwise.

We believe that prices in the rock products industry, as a whole, have been eminently fair at times when there was every inducement to profiteer. In most of the rock products industries trade association meetings have been open and have been remarkably free from any taint of conspiracy or collusion. In fact they have often been notable for the high-minded attitude of the producers toward their responsibilities to the public. Those meetings that have been held behind doors may have been equally so, but they are the kind of meetings that *always* start investigations; so if you really intend to play fair with the public experience invariably shows that it is better to take the public into your confidence and lay the cards on the table; for as Lincoln once said: "You may fool some people all the time, you may fool all the people some of the time, but you can't fool *all* the people *all* the time."

Tribute from a High Source to Rock Products Industries

SPEAKING at the recent annual meeting of the Portland Cement Association, Dr. George Otis Smith, the director of the U. S. Geological Survey, said:

"We are apt not to pay enough honor to the humble but useful things of life. The dominant position of our country in a world of industry and commerce is due largely to our wealth in the essential minerals, and the statistical record of the growth of our mineral industry shows how the baser metals have taken the leadership from gold and silver. Indeed, the non-metals, once of subordinate rank, now far exceed the metals in value of annual output. To make a more specific comparison, the three building materials, cement, stone and clay products, reached last year an output valued at $500,000,000 and exceeded the total value of all the metals except iron. The annual output of your own product, cement, exceeds in value that of any two of the metals except iron and copper. Upon these the daily life of our industries depends."

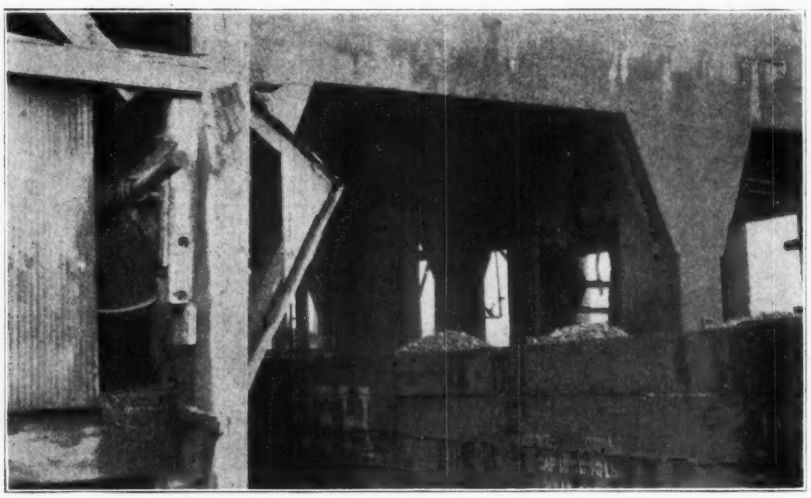
Hints and Helps for Superintendents

Final Gravel Washing

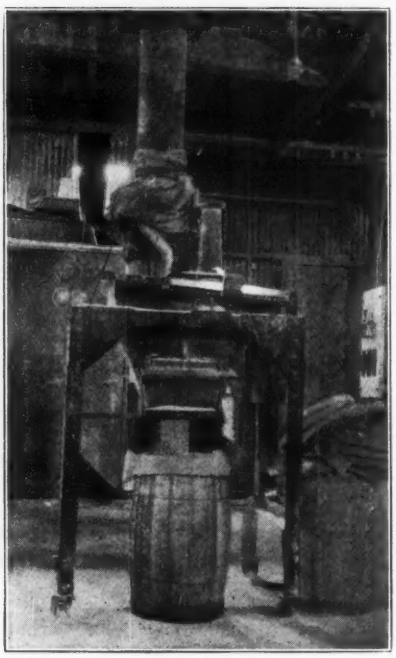
THE CARMICHAEL GRAVEL CO., Williamsport, Ind., is famous for its *clean* gravel. The view shows why.

The sand and gravel plant is a very efficient one and the material is thoroughly washed and screened before it goes into the car-loading bins. But just as it is true that "accidents sometimes happen in the best of families," so it is true that silt and sand sometimes find their way into the best of washed gravel.

So, surrounding the gravel-loading spout in the bottom of the concrete bin are perforated clean-water pipes, so that as the gravel falls into the car, and the gravel that has just fallen into the car, are treated to a final shower bath, leaving it as clean as a whistle.



Final washing of gravel as it is loaded in gondolas



Automatic weighing lime barrel filler

The expense of the water can not be so very much, where it is plentiful, and the fine appearance of the gravel after its final washing in the car, certainly enhances its value in the eyes of supercritical engineers.

Weighing Barrel Filler

FROM THE MANY homemade devices used at lime and cement plants for filling and weighing wooden barrels, it is evidently not generally known that there is on the market a special device for this purpose.

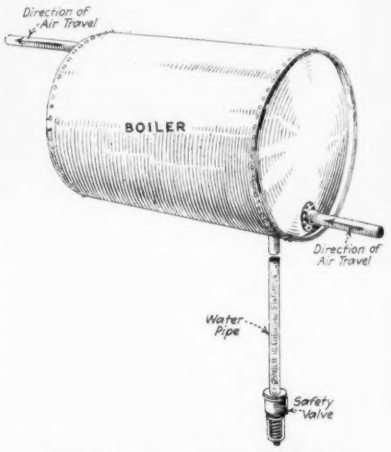
The illustration herewith shows one in use at the plant of the Vermarco Lime Co., West Rutland, Vt. It consists of a steel hopper mounted on scales which can be set to any desired amount. When the weight of lime in the hopper balances the scales the feed from the pipe on chute overhead is automatically cut off, and the weighed amount of lime in the hopper discharged to the barrel below.

The view herewith shows the device used for loading pulverized lime, which accounts for the joints in the feed spout being wrapped with burlap.

Removing Water From Compressed Air

THE PRESENCE OF WATER in compressed air is one of the principal causes of machine-drill repairs, owing to the fact that water in the air, in a few strokes of the machine, replaces the oil, leaving the drill to run without lubrication until the machine is again oiled; but even then, it is only a short time until the machine is again divested of its lubrication. This is a source of loss of time as well as money, and the obvious solution is to remove the water from the compressed air.

One method which has come to my attention consists in incorporating an old steam dome, or boiler, into the main air line leading away from the compressor, at a sufficient distance from the compressor to permit the precipitation of the



Tank for removing water from compressed-air line

humidity in the air. The air line enters the bottom of the boiler and passes out through the top at the other end, the boiler being used as a catch basin for the precipitated water. To dispose of this water automatically a 2-in. pipe leads away from the bottom of the boiler and down an old winze, or down the sides of a hill. On the end of this water-discharge pipe a safety valve was connected, set to open under a pressure of 100 lb. At all times, when there is air in the line, there is a pressure of 90 lb. (any other suitable gauge pressure would do) exerted against this safety valve, and when the column of water in the discharge pipe becomes sufficient to weigh 10 lb., making a total of 100 lb. exerted on the valve, it opens,

thereby automatically releasing the water from the air line. Operation and maintenance involve no expense.—G. L. Schmutz in the "Engineering and Mining Journal."

Pole Car-Dumper

TWO CALIFORNIA quarry operators have a method of dumping quarry cars by use of a pole or strut placed under one corner or one side of a side-dumping car. The pole is a little shorter than the distance from the ground to the bottom of the tilted car.

The ground end of the pole is placed in a socket in the floor, or against a strut, to keep it from slipping. The power for dumping the car is supplied by the train locomotive, which simply pushes the train ahead. The upper end of the pole is inserted in a socket or against a strut on the car body and the forward movement of the train dumps the car.

At the plant shown here, the Riverside Portland Cement Co., ordinary side-dump contractor-type of cars having 12 or 15 cu. yd. capacity are used. Some of these cars, as one of the views show, were designed to dump by compressed air. This of course involved air-pipe couplings with the locomotive and operation over a better ballasted track than is ordinarily the case in quarry operations.

These cars have reinforced bottoms, made of railway rails laid close together with the heads up. The cars are righted after they are dumped by an air-piston hoist on the opposite side of the track from the dumping pole, as shown in one of the views. The dumping operation thus requires two men, one to place the pole in place and the other to operate the hoist.

The car dumper at the Victorville plant of the Southwestern Portland Cement Co. operates on the same principle but has many improved features. These will be described in a later issue.

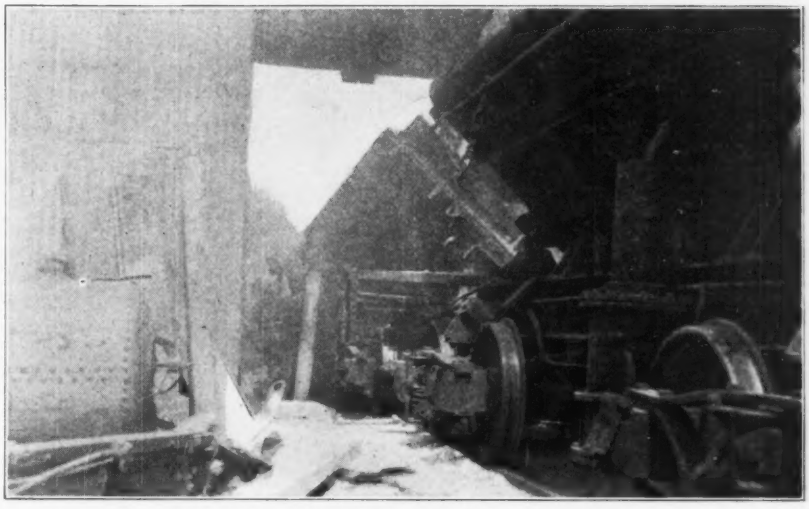
How to Cut Wire Rope

A PRACTICABLE WAY to cut wire rope is thus: First, securely bind the rope on each side of the place to be cut; place the cable over a length of old railroad rail or a piece of steel; then cut by means of a coal cutting chisel with handle and a sledge hammer.

If it is necessary to cut ropes frequently it is advisable to secure a special cutter for the purpose.

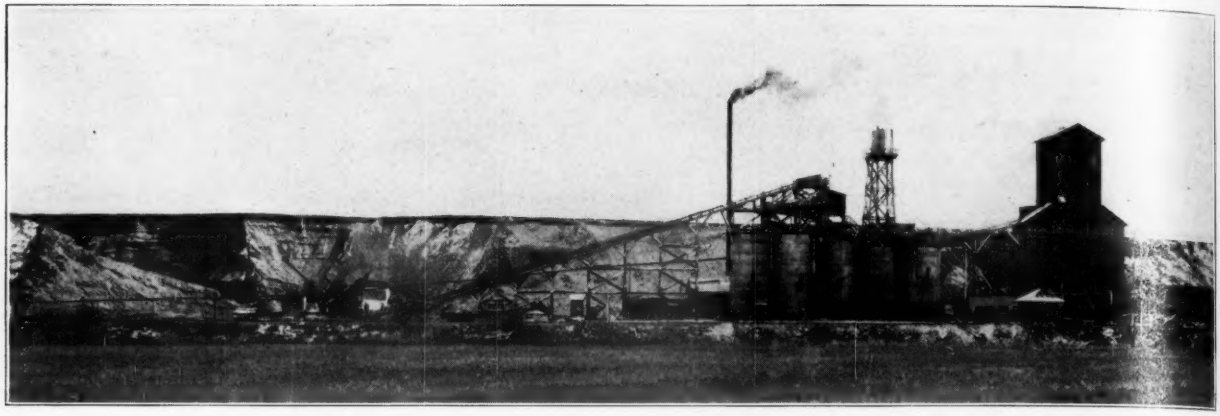
WE WANT to hear from plant superintendents who have found out ways to do things. Nearly everyone of you has some pet kink up your sleeve. Don't be too modest! Why not let the rest of the fraternity in on it?—Editor.

Pole car dumper at the plant of the Riverside Portland Cement Co.



Near view of dumper showing its use on cars equipped with compressed air dumping apparatus

Righting the cars with a compressed-air operated hoist



Producing Sand-Blast Material

Eau Claire Sand and Gravel Company, Eau Claire, Wisconsin, Has Simple and Compact Plant With Many Special Devices

IT HAS OFTEN BEEN STATED that sand and gravel plant methods of operation develop by districts; that is, if some original operator makes a success of dragline operation, his subsequent competitors usually adopt the same method of operation. An exception to this rule is the Eau Claire Sand and Gravel Co., at Eau Claire, Wis., whose plant possesses the outstanding characteristics of simplicity, compactness, durability and the adoption of many special devices; a plant containing many original methods of operation.

The plant consists of two sections; one for washing the material and one for drying. The first unit was built in 1918 by the Smith Engineering Works of Milwaukee, Wis., and the second unit was designed and built by the sand company itself, being completed just recently at an approximate cost of $40,000. Special attention is called in the first unit to the use of concrete silos for storage of sand and gravel, and the use of a settling classifier to classify the different grades of material; in the second unit to the use of the drying apparatus and screening devices.

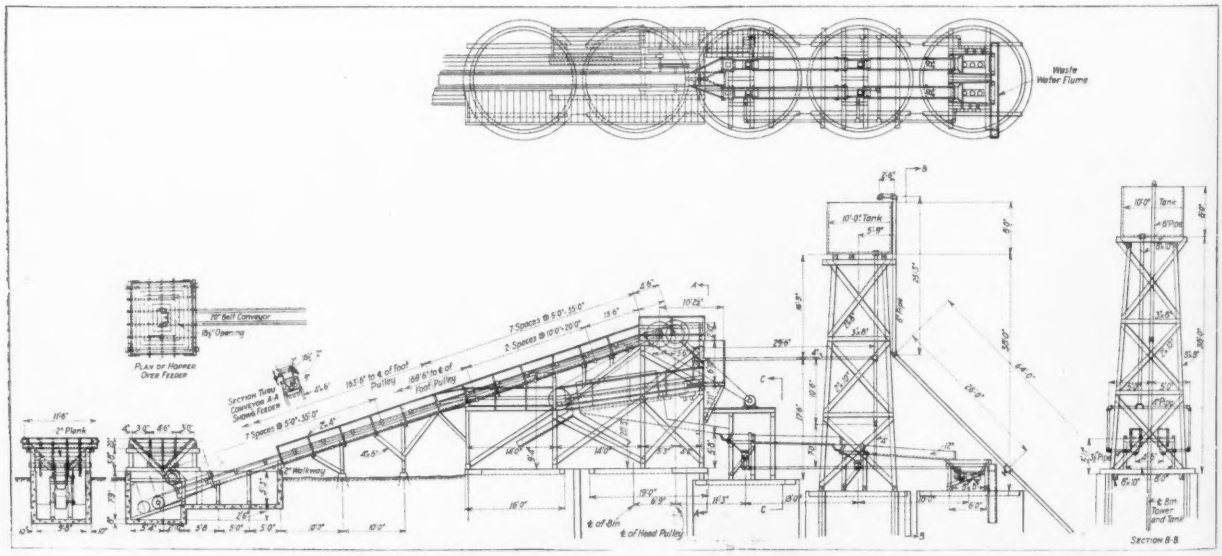
The following analysis of the material owned by this company was made by O. J. Roberg, pharmacist and analytical chemist of Eau Claire:

Loss on ignition	.37%
Silica	88.79%
Iron oxide and alumina	9.67%
Calcium oxide	.88%
Magnesium oxide	.29%
	100.00%

Deposit and Method of Excavation

The plant is located in one of the most extensive sand and gravel deposits in Wisconsin. Already vast inroads have been made in these deposits, both for local work and shipment to other localities. The deposit at the plant of the Eau Claire Sand and Gravel Co. is of a glacial formation ranging in height from 48 ft. to 70 ft., and containing from 25 to 75 per cent gravel. The company owns a 100-acre tract of land here, and the deposit is particularly satisfactory for sand-blast work and roofing gravel, with the larger sizes screened out for various kinds of concrete and road work.

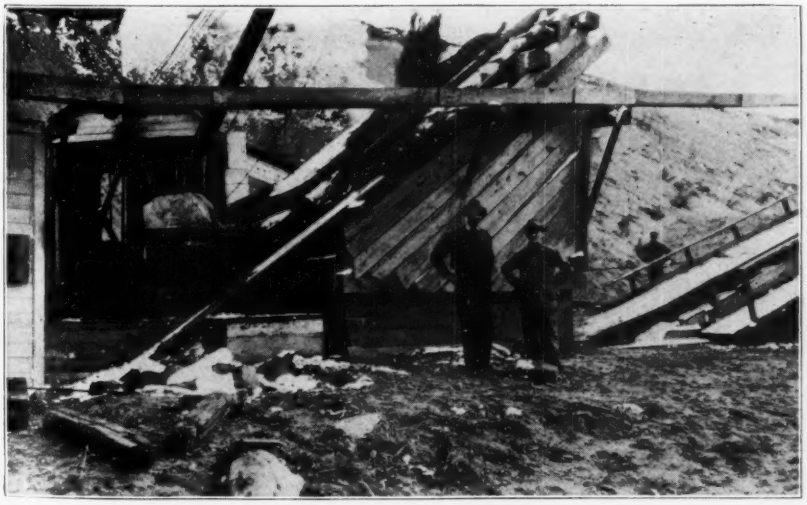
The primary handling of the material is done by means of a Williams "portocrane" mounted on a self-propelling truck, which carries a 30-ft. boom to which is attached either a ½-cu. yd. clamshell bucket or a dragline excavator bucket. The dragline excavator bucket is used to



Elevation of unit No. 1, from hopper to classifiers

Crane depositing material over gravity screen

Waste flume. Note character of deposit



Gravity screen and crusher

get the material within the proximity of the belt conveyor and then the clamshell bucket is attached for loading the material on the belt. The dragline is used only when the plant has ceased operation and enough sand is brought near the conveyor to keep the crane and clamshell bucket busy for a day's time. This operation usually takes place toward the end of the day. The crane is of the 20-ton type and has a 6½ x 10-in. double cylinder friction drum hoisting engine and boiler, besides an independent swinging and traction engine.

Crushing and Screening

The clam-shell bucket, reclaiming the material within a 30-ft. radius of the crane, deposits the material over a gravity screen, underneath which is the hopper feeding the belt conveyor. This is not shown in the drawings accompanying this article, as it is a recent change, but it is shown in one of the accompanying views. The material going through this gravity screen, 1½-in. and smaller, falls into the hopper and through the feeding device onto the belt conveyor, while the rejections from the gravity screen go direct to a No. 3 gyratory crusher where the material is reduced to 1½-in. size, and it also goes through the feeding device at the bottom of the hopper, and to the belt conveyor. The crusher is run by a 35-h.p. motor. This feeding device is home-made and consists merely of a hand screw and wheel operating through a board controlling the opening of the hopper at the bottom, where the material falls on the belt conveyor. As the hand screw is turned to the left the opening increases, or as it is turned to the right the opening decreases; in this manner, the flow of the material onto the belt conveyor is controlled by hand.

The material from the hopper is conveyed to the receiving box on a 20-in. belt conveyor, 413 ft. centers, with a total rise of 61 ft. 6 in. The receiving box is 4 ft.

Loading a car

square, and the material is washed out of it by means of a stream of water from a 3-in. pipe, the material going direct to the rotary screen, 40-in. diameter, 13 ft. long. A stream of water from a 2-in. pipe within the screen gives the material a thorough washing as it is being revolved, besides helping to make the separation.

The screen is composed of two concentric shells perforated with 9/32-in. and ⅛-in. holes, respectively, which separates the material into concrete gravel, 1½ to 4 in.; roofing gravel, ¼ to 1⅛ in., and sand ⅛ in. down. The two sizes of gravel are chuted to the first and second bins, and the sand is carried by means of steel an wood sluiceways to the classifiers.

Classifiers

The classifiers used by the Eau Claire Sand and Gravel Co. are known as the Richards hindered settling classifier, manufactured by Allis-Chalmers Manufacturing Co., Milwaukee, Wis. This classifier has heretofore been used exclusively in metal mining operations, especially in concentrating mills handling large tonnages of low grade ores, where fine material is formed in the ordinary process of crushing and also from the regrinding of particles containing included grains of ore. This is probably the first instance of its use in sand and gravel operations. The purpose of the classifier is to make an accurate separation hydraulicly of the different sizes of sand, thus avoiding the necessity of drying the material and making a separation on screens.

The Richards hindered settling classifier operates on the hindered settling principle by introducing a constriction in the lower part of the sorting column through which all classified particles and the rising water pass in opposite directions. Above the constriction there is a mass of particles in "teeter" or suspension, similar to quick sand in a bubbling spring, and it is through this mass of hindering quick sand that the classified particle must make its way, first by forming part of the quick sand, then working to the bottom, gravity exerting greater force upon it than the rising current of water, with the result that it finally drops through the discharge bushing.

Not only does the classifier separate the particles into different sizes, but it also thoroughly washes them, with the result that the clay is separated from the sand, and passes out into the over-flow.

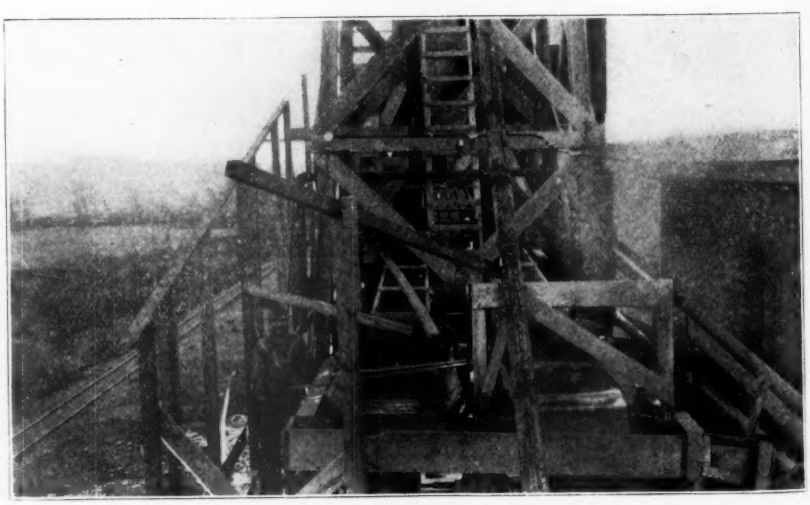
The sand is carried by means of steel chutes first to a set of one-spigot classifiers, making the 20-mesh separation, then to another set of one-spigot classifiers making a 30-mesh separation, following which is a set of three-spigot classifiers making the 40-mesh separation. The overflow from the last set of classifiers containing slimes and clay goes to the flume and into the pond as waste.

Advantages of the Hydraulic Classifiers

The great advantage claimed for this

Concrete bins and hinged chutes for loading

Flexible spouts for loading from unit No. 2



Steel pans and top view of classifiers

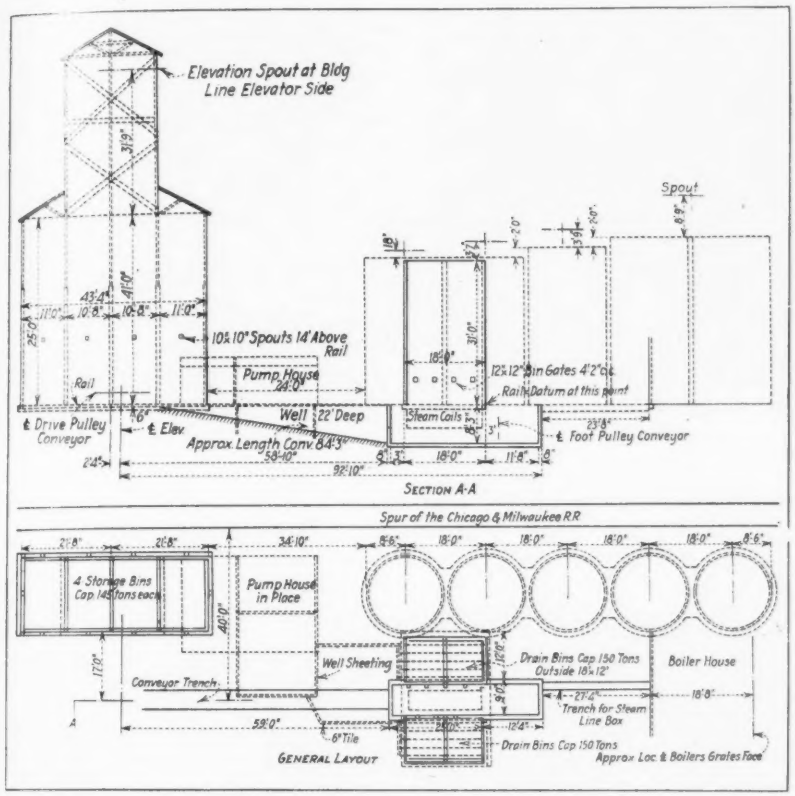
classifier is that there are no moving parts, practically no repair parts, with the exception of the necessity of installing a new bushing about once a year, at the bottom of the classifier, and the saving of heat necessary to dry the material, which is required before screening the material dry is practicable. The only precautions which must be taken in a classifier of this kind, are, that the feed and pressure of the water supply must be *constant* at all times.

The material after it is discharged from the classifier contains about one part of water to one of sand, and it is fed into the bins where the water is allowed to drain off, and the material discharged into cars for shipment.

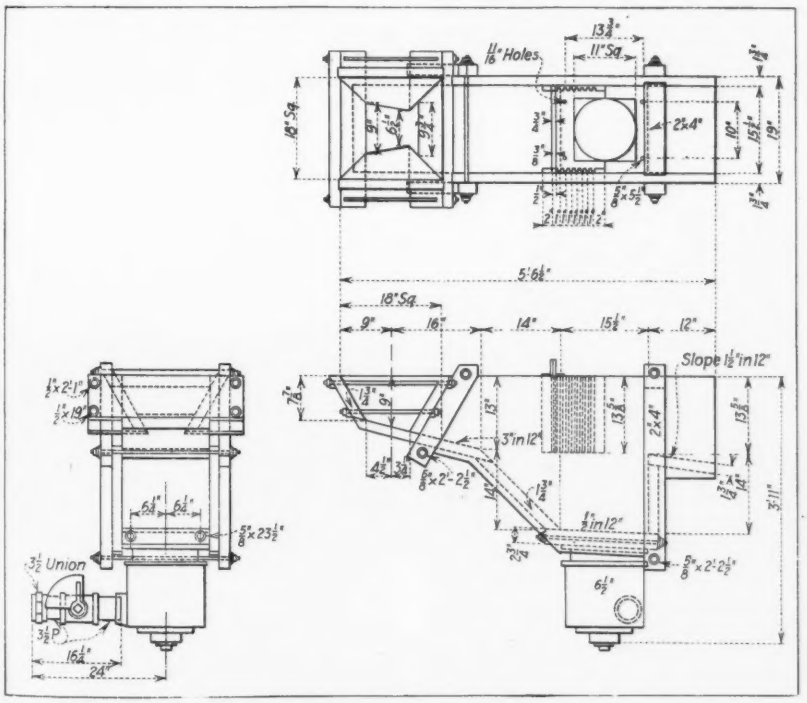
Construction, Unit No. 1

The bins or silos containing the material ranging from gravel 1½ in. to No. 40 mesh sand, are all constructed of reinforced concrete, having an inside diameter of 16 ft. with 6-in. walls. The tallest of the bins is 35 ft. 7 in. from the grade line and the shortest one is 4 ft. lower. Each bin is provided on the railway track side with a hinged chute for loading cars.

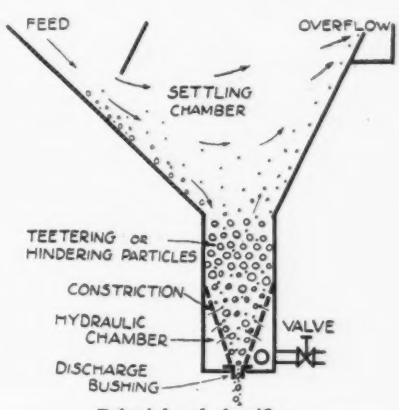
The hopper pit is constructed of concrete to the ground line and of timber framing above the ground line. The trestle incline is built of timber on concrete piers, and the framing is extended



General layout of units Nos. 1 and 2

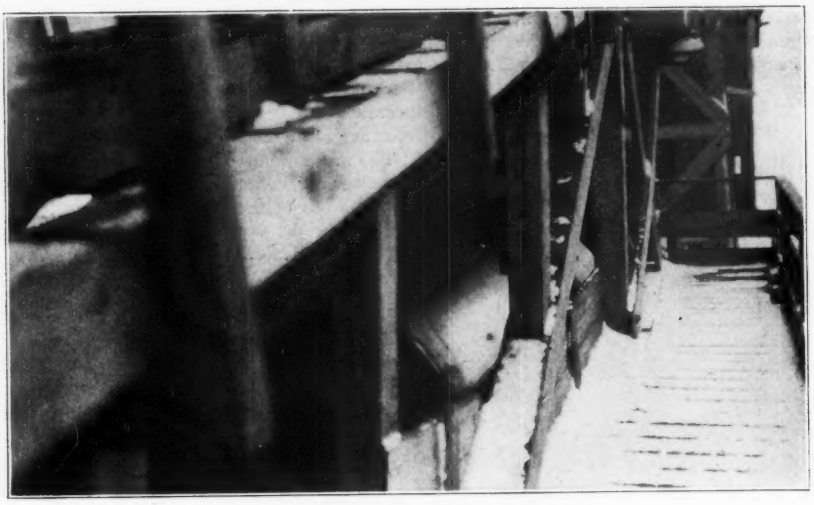


Details of Richards hindered settling classifier

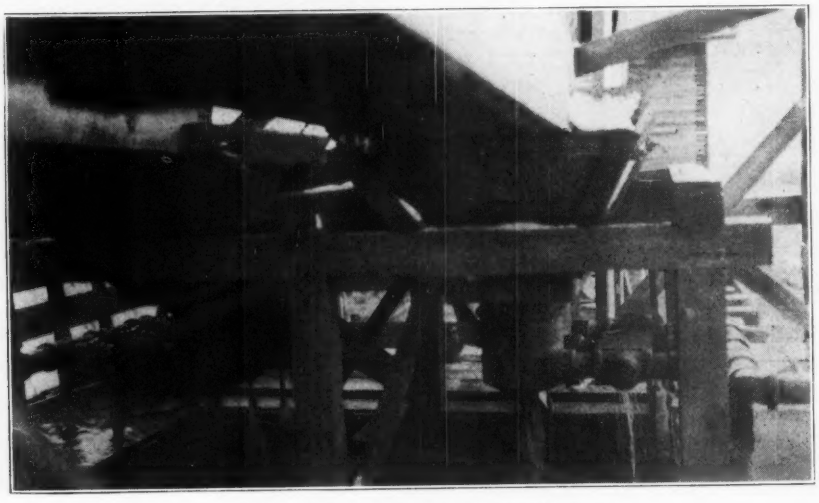


Principle of classifier

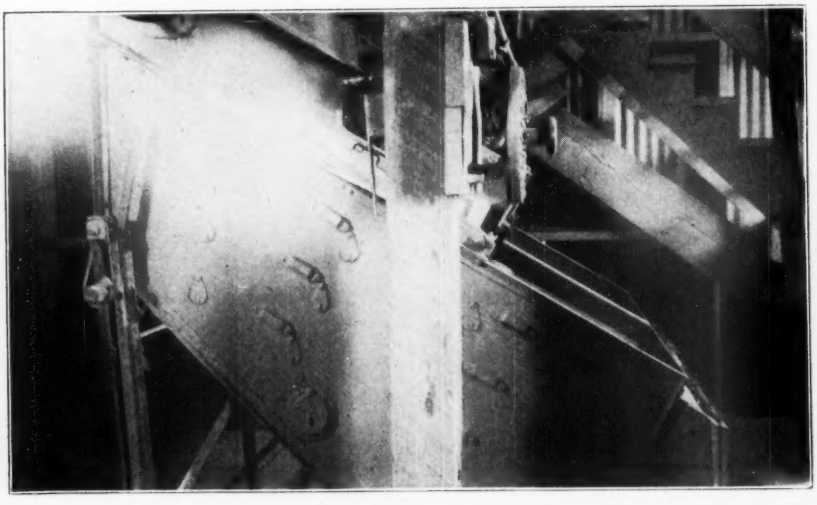
Elevator to top of unit No. 2



Rotary screen—waste flume overhead



Richards hindered settling classifier



"Hummer" electro magnetic vibrating screen

over the bins for supporting screens, belt pulleys, classifiers, water tank and piping.

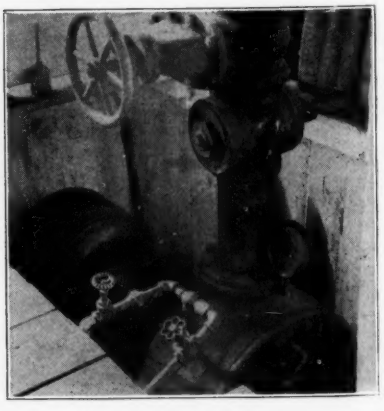
The galvanized-iron tank on top of the concrete bins is filled with water by means of a 5-in. centrifugal pump direct connected to a 35-h.p. motor. The water is pumped from three 6-in. points driven from 15 ft. to 20 ft. below the bottom of a 22-ft. well (the well being originally sunk to furnish the entire water supply, but was found inadequate), through a 6-in. suction pipe, and elevated to the top of tank, a distance of 78 ft. above the ground line. This, of course, gives the constancy of head necessary.

Drying and Screening Plant

Very often a blast sand is specified as a dried material by many consumers, and in order to furnish this sort of material, for which the company has a large demand, it has installed a drying and screening plant, known as Unit No. 2, which, as stated before has but recently been completed at an approximate cost of $40,000.

As the material is required for drying it is by-passed from the silos and deposited into two draining bins of 150 tons capacity each. From here it falls onto the steam pipe tiers for drying. These are located in a pit 8 ft. 3 in. high, 9 ft. wide, and 37 ft. 4 in long. A pressure of 90 lbs. of steam is forced through the pipes, and as the material dries it falls through the tiers onto a belt conveyor, located underneath the tiers of pipes. This belt conveyor is 20 in. wide, 84 ft. 3-in. centers and is entirely in tunnel, depositing the material at the foot of the bucket elevator.

The bucket elevator takes the material up to the top of the screening plant a distance of 90 ft. depositing it into a hopper feeding two electrically vibrated "Hummer" screens. The vibration is produced by means of an electro-magnet and is applied directly to a taut drumhead tension screening surface. The screen is inclined at a 30° angle and makes three separations; No.'s 20, 30 and 40 mesh, each product being spouted to its respective bin. The dry-sand bins, of which there are four, have a capacity of 150 tons each, and are of wooden con-

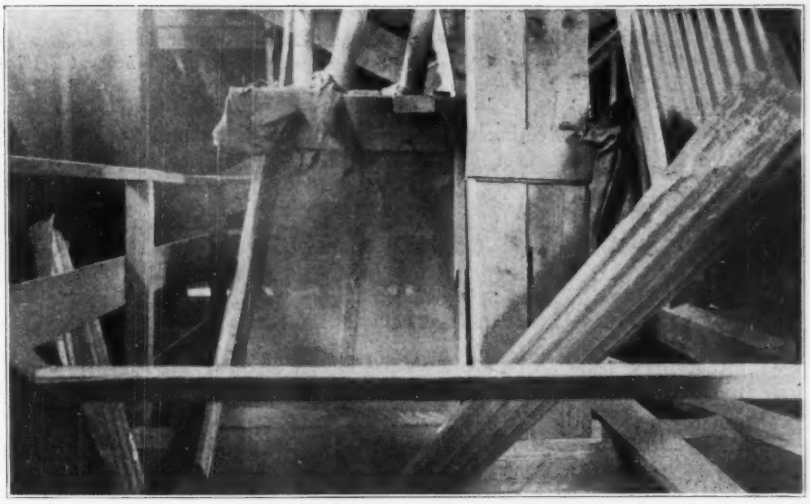


Centrifugal pump and motor

struction, with dove-tail joints. From these bins the cars are loaded direct by means of flexible pipes. Steam is furnished to the steam dryer from a 100-h.p. return water-tube boiler. The boiler house is certainly a model of efficiency. It is fitted with tank condensers, steam traps and injector, which all increase the efficiency of the boiler and decrease the cost of drying. Only 10 wheelbarrows of coal are used for boiler consumption each day, so it can readily be seen that the drying operation is not very expensive. An accompanying plan shows the complete layout of the steam tiers.

Concrete Brick a By-Product

Besides the operations mentioned the company has also a concrete-brick plant adjoining Unit No. 2, or the screening plant. The sand and gravel are obtained from the rotary screen by means of a by-pass and flume, depositing the material in a wooden bin, 12 ft. x 12 ft. x 22 ft. As the sand and gravel is needed it is drawn out from the bin into a mixer, where cement is added. After the mix has become uniform, it is deposited near the brick press, and is ready for pressing. The brick are laid on flat cars and trucked away to steam chambers, or so-called kilns, for curing. There are four steam-treating chambers and three cars of brick



Gravity screen for a fourth separation

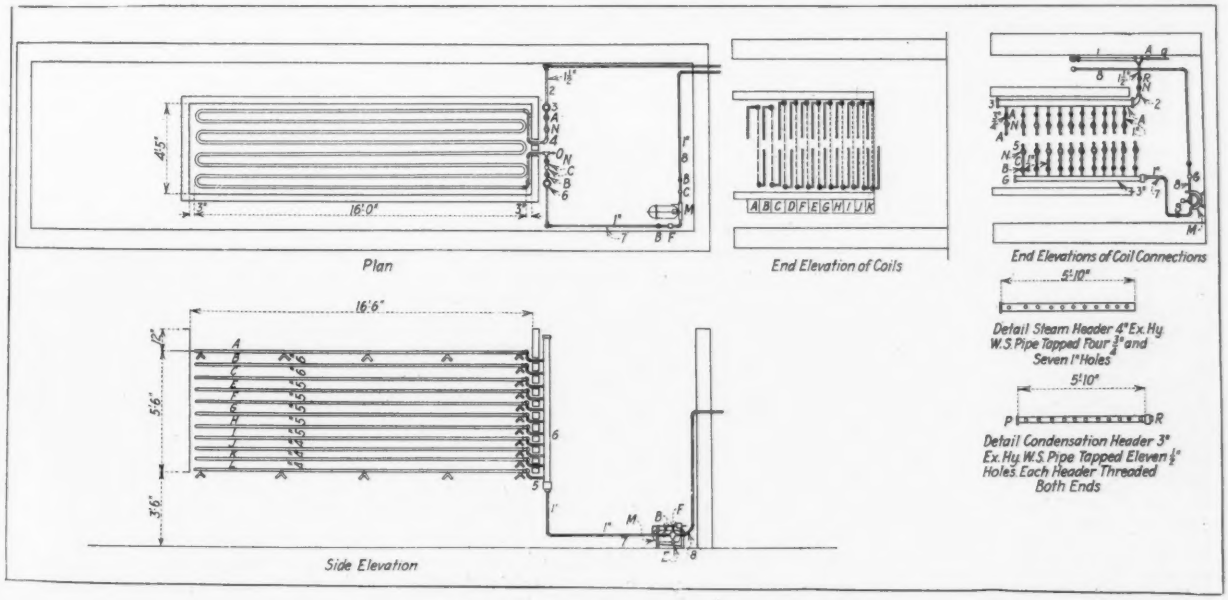
Working crew of Eau Claire Sand and Gravel Co.

Connections

1. Steam main.
2. Steam to header.
3. Steam header.
4. Steam to each coil.
5. Condensation from each coil.
6. Condensation header.
7. Condensation to trap.
8. Discharge from trap.
9. Steam main drain.

Valves and Specialties

A. Globe valve.
B. Gate valve.
C. Check valve.
E. Steam cock.
F. Sediment trap.
M. Cranetilt non-return trap.
N. Union.
O. One-eighth inch cock for each coil.
P. Cap.
R. 3x1 reducing coupling.



General layout of pipes and piping for steam coils

can be put in each one. Steam, under a pressure of 90 lbs. is forced into the chambers, where the brick remain 12 hrs. The steam is then blown off, returned to the tank condenser, and the brick are taken out into the air, for further curing, usually for a period of from two to three weeks.

Organization—Personnel

The company has its offices at 7-8 Ingram Bldg., Eau Claire, Wis., and is capitalized for $150,000. Most of its sand blast material is shipped to Chicago and Milwaukee and it has sales representatives in both places. F. E. Nicoles is president of the company; C. L. Tolles, vice-president; J. B. Fleming, secretary-treasurer; A. O. Ayres, general manager and John Stewart, superintendent.

The Causes and Effects of Acid Conditions in Soils*

Not Necessary That Soils Be Sweet for All Crops, but Acidity Must Be Kept Within Certain Limits

By Dr. J. G. Lipman, New Jersey State Department of Agriculture

SOUR OR ACID SOILS are quite common in the humid regions of the United States and of other countries. The older soils in these regions are more acid or are more frequently acid than soils of the same type that have been under cultivation for a shorter time. For this reason, soil acidity becomes more and more of a practical problem in the older agricultural sections. Hence, a knowledge of the nature, the causes and effect of soil acidity is desirable and necessary for every farmer who would utilize his land to the best advantage.

Recent investigations show that soil acidity may be due to different causes or to different chemical changes. It may be due to materials of mineral origin or to those of vegetable and animal origin. Not many years ago it was believed that soil acidity was due entirely to substances of vegetable origin. It was claimed, therefore, that soil acidity was derived almost entirely from soil humus. We know now that soils very poor in humus may be just as sour, or even more sour, than soils that are rich in humus.

Use of Fertilizers Increases Need of Lime

As soils grow older they lose, on account of leaching, much of their lime and other materials capable of neutralizing acids. Soils that receive large amounts of rainfall will develop acidity faster than soils receiving smaller amounts of rainfall. Where fertilizers are used more or less regularly the development of acidity is encouraged. Materials like potash salts, acid phosphate and ammonia salts —particularly the latter—will hasten the rise of acidity in soils. But, since the degree of acidity bears a certain definite relation to plant growth, it is worth while to inquire into the nature of it, and as to the effect which it may have on soil bacteria, soil fungi and the cultivated plants.

It has been definitely established that a slight degree of acidity is not objectionable either from the standpoint of soil bacteria or the crops themselves. But, as the degree of acidity is increased, the useful soil bacteria, particularly those that produce ammonia and nitrates and those that help to accumulate nitrogen from the air, are injuriously affected. It is not necessary to keep a soil sweet, but it is necessary to prevent a soil from becoming too sour. This fact gains in importance as we recognize that by increasing the degree of acidity we not only gradually suppress the activities of the useful bacteria, but also encourage the multiplication of fungi that may interfere with the feeding of the crops or actually injure the plants. Different kinds of root rots, the development of club root in cabbage, cauliflower and other members of the cabbage family, are examples of this sort. By reducing the acidity of the soil these fungi are hindered in their growth and the plants protected against their attacks.

Some Cases Where Slightly Acid Soils Are Desired

On the contrary, there are other fungi which thrive best when the soil is sweet or has only a slight degree of acidity. This applies particularly to the organisms that produce scab on potatoes and beets or scurf on sweet potatoes. It, therefore, becomes the problem of the potato, beet or sweet potato grower to increase the acidity of his soil to a point where the objectionable fungi would not cause serious injury to his crops and yet avoid an acidity great enough to interfere with the activities of the useful bacteria or with the welfare of the crop. Fortunately, chemistry has in recent years placed at our disposal a method whereby we can measure accurately the degree of soil acidity that would suppress the activities of these objectionable bacteria without interfering with the crops. Fertilizers and other materials that increase the degree of soil acidity are now being used successfully for this purpose. Acid phosphate, sulphate of ammonia and particularly sulphur can be used in such a manner as to increase the soil acidity to a point where potato scab organisms are no longer troublesome, but the potatoes themselves and the bacteria which are relied upon to supply the crop with nitrates are not injuriously affected. With the more refined chemical methods now in our hands, we are in a position to measure carefully the degree of acidity at which different groups or different species of soil micro-organisms would best function.

Damage to Crops

Recent investigations show also that the damage done to crops in acid soils is not always due to the acids themselves. It has been shown that in some acid soils there are developed poisonous products, particularly certain salts of alumina and iron, that poison the plants. In cases like these the use of lime is effective because the poisonous compounds of alumina and iron are made insoluble rather than because of the lessening of the degree of soil acidity. It has been demonstrated, for instance, that the application of large quantities of acid phosphate produces beneficial results even though the degree of soil acidity is not lowered, but the soluble compounds of alumina and iron are made insoluble. Such helpful changes are most readily produced in heavy, poorly drained clay or silt soils.

It has been shown, further, that insoluble phosphates and potash compounds become more readily soluble in acid soils than they do in sweet soils. In certain acid soils ground phosphate rock or bone meal often give as good results as acid phosphate. This advantage is more than offset by the diminished production of nitrates and the diminished accumulation of nitrogen by legumes. There is also danger where soils are excessively acid of losing too much lime, potash and even phosphates from the soil.

It is evident, therefore, that the problem is a more or less complicated one and involves a careful study of soil type, the nature of fertilizers used and the nature of the crop grown. It will be possible, as our soil investigations are continued, to determine the best degree of acidity for each soil and for each crop. Hence, the more refined methods for measuring soil acidity are a welcome addition to the equipment of the soil investigator.

*Reprinted from the "Pennsylvania Farmer," December 25, 1920.

Development in Wet Process Portland Cement Plants--II

Description of Bessemer Limestone and Cement Company, Bessemer, Pennsylvania, from Kilns to Finished Product—Details of Up-to-Date Power Plant

THIS IS A CONTINUATION and the final installment of an article on the Bessemer Limestone and Cement Co., Bessemer, Pa., which appeared in the January 1, 1921, issue of ROCK PRODUCTS.

Kilns

The kilns, of which there are three, are mounted upon concrete piers and are built up in two sections, 10 ft. dia. x 175 ft. long and 8 ft. dia. x 60 ft. long, connected by a flexible joint. The 60-ft. extension is provided with the view of installing waste heat boilers later on, but it now acts as a dryer. If waste heat boilers are installed this section will be taken out.

The kilns discharge directly into 8 x 60-ft. coolers which are set under the burning platforms of the kilns. The kiln hoods are carried on concrete supports, which help form the housing at the feed end of the coolers. The coolers are provided with stacks and dampers, which can be so regulated as to allow the kilns to draw all the hot air possible from the coolers. The coolers discharge into a pit 18 ft. deep, 24 ft. wide and 75 ft. long, from which it is reclaimed by a Terry crane mounted upon a concrete pier, 25 ft. high. This crane has a boom 100 ft. long provided with a 3-cu. yd. clam-shell bucket, and can store material anywhere within an 80-ft. radius of crane. This crane is electrically operated and can store enough clinker for a six-months' run. This is probably the greatest storage of clinker in any plant, where only one handling is encountered.

Coal Mill

The coal is brought in from the main track on a concrete trestle 574 ft. long and 15 ft. high and is dumped on the ground. At the upper end of the trestle is located a tunnel 260 ft. long, housing a 16-in. belt conveyor of 251 ft. centers. This tunnel has fifty-two 10-in. pipes on the top through which the material goes to a traveling table feeder over the belt conveyor. This belt conveyor discharges into a 24-in. x 24-in. Jeffrey coal crusher, which discharges onto a 16-in. belt conveyor of 15-ft. centers, depositing the crushed coal in a pit, from which it is reclaimed by elevator No. 5 and discharged direct to the dryer.

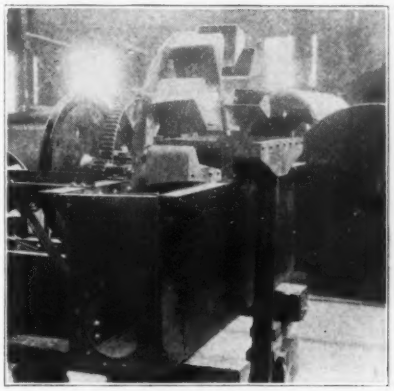
The dryer is the "Ebro" type (Allis-Chalmers), 6 x 60-ft., hand-fired. The hot gases in this dryer pass around the exterior of the shell (two shell dryer) to the discharge end, then entering the hood and going through the interior shell to the housing at the head end of the dryer. Draft is supplied to the dryer by a No. 4½ American blower.

The coal discharging from the dryer is reclaimed by elevator No. 6 and deposited in a hopper feeding a 300-lb. Richardson automatic coal scale, which discharges direct to a 10-ft. dia x 15-ft. compeb-mill feeding bin of 28 tons' capacity. This bin supplies a No. 22 compeb mill, through an improved type shaker feed. The mill is run by a 300-h.p. synchronous motor, direct connected through a 44-in. magnetic clutch. After thorough grinding the mill discharges into a 12-in. screw conveyor, 18 ft. long, which carries it to elevator No. 7, which discharges into another 12-in. screw conveyor, 120 ft. long, leading to the kiln building. The pulverized coal then falls into three steel storage bins 12 ft. dia. x 25 ft. high, having a capacity of 45 tons each. This provides for a surplus stock of pulverized coal.

The coal is drawn out of the bins into a 12-in. screw conveyor, 37 ft. long, which discharges into the same elevator feeding the conveyor leading to kiln building. In the kiln building the screw conveyor discharges into three steel coal bins of 24 tons' capacity each, located in front of the kilns. The pulverized coal is fed from each bin by two 6-in. screws, which discharge into an Allis-Chalmers coal injector, and it is then picked up by air furnished by a No. 10 American blower and discharged into the kilns. This blower is so arranged that air can be drawn from the feed end of coolers, thus injecting pre-heated air into the kilns.

Reclaiming Clinker

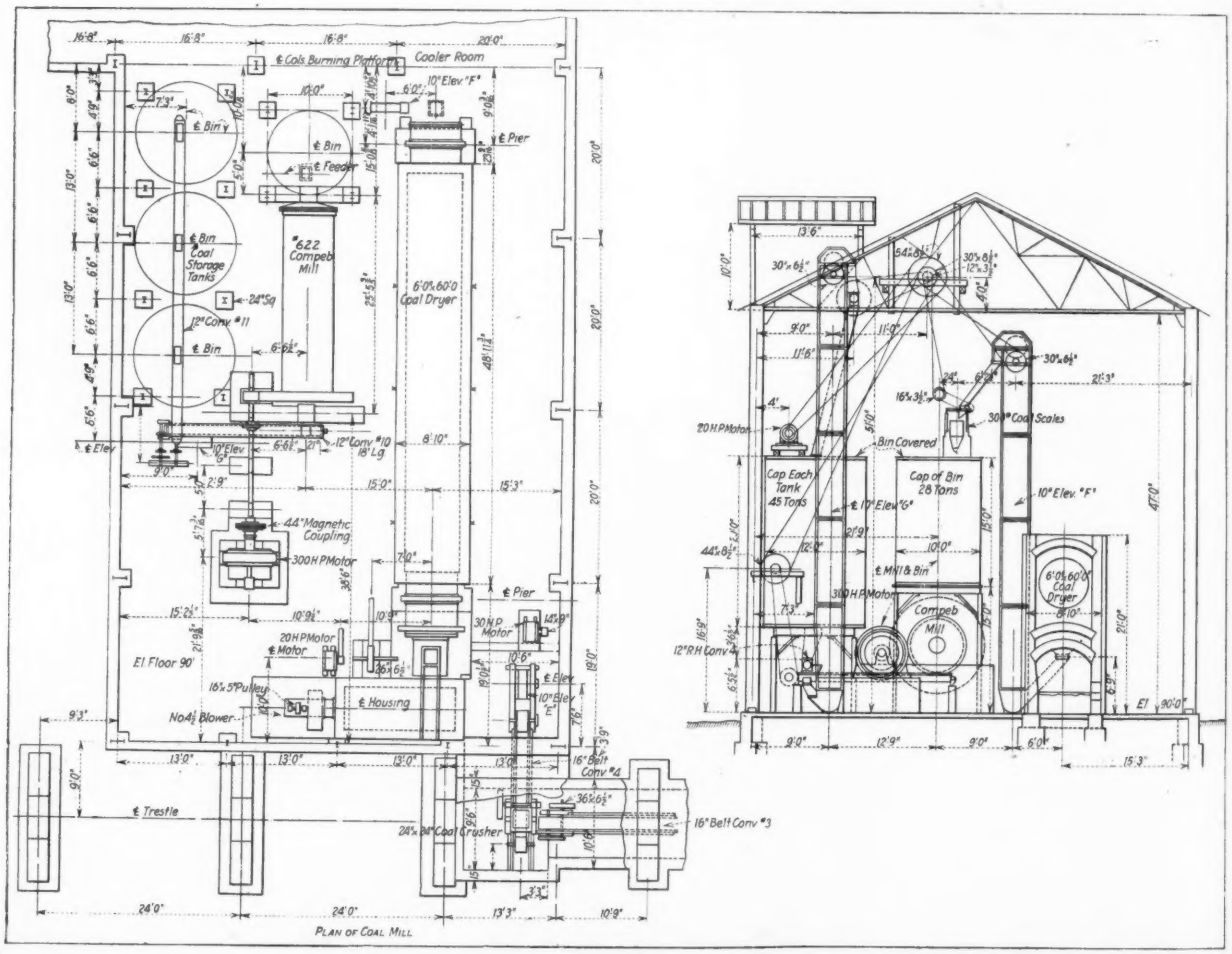
Underneath the clinker storage served by the Terry crane is a concrete tunnel 260 ft. long, on a 2-ft. slope. This tunnel is also provided with 10-in. pipe openings at the top, and houses a 20-in. belt conveyor of 250 ft. centers, provided with a traveling table feeder. The clinker is stored at different points on this tunnel



Ferris wheel slurry feeder

Shale trestle and conveyor to storage

Burning platform showing portion of coal bin, twin screw feeder, No. 10 blower, coal injector and portable kiln hood. Blower is so arranged that air can be drawn from feed end of coolers, thereby injecting pre-heated air into the kilns. Concrete support at kiln hood forms housing for feed end of coolers



PLAN OF COAL MILL

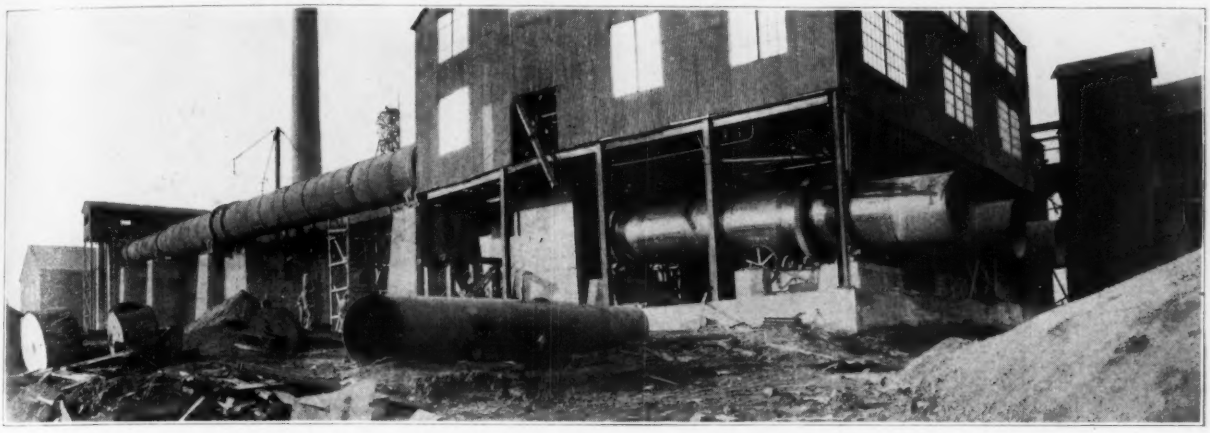
Plan and cross section of coal mill, showing dryer, elevators, compeb mill and coal storage tanks. Steel and concrete construction throughout

and drops through the 10-in. pipes to the table feeder and then onto a belt which discharges into elevator No. 8, and then into a clinker bin having a 14-ton capacity.

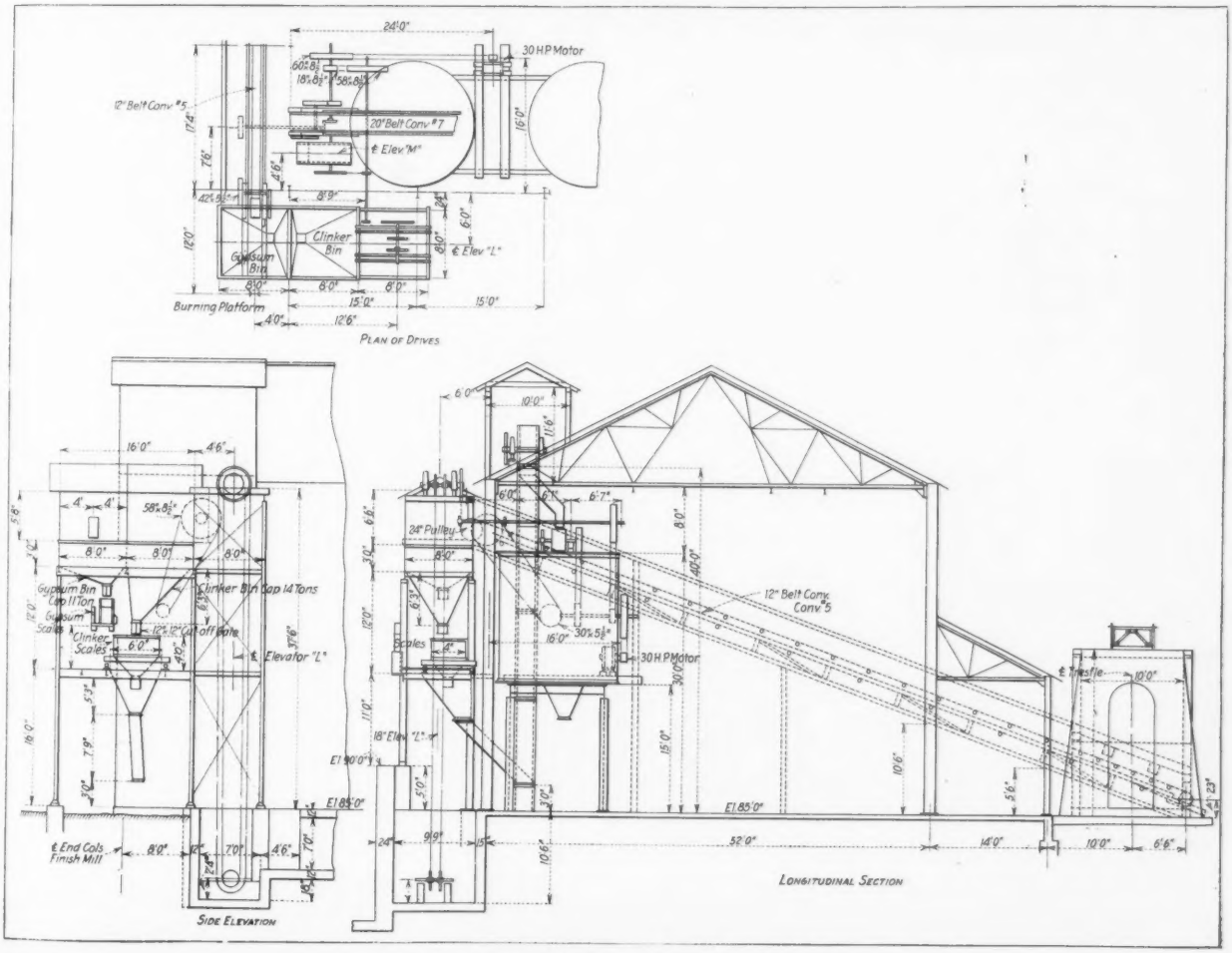
The gypsum is brought in on cars on the same trestle that the coal is brought over, and dumped into a wooden bin situated at the lower end of the coal storage. The gypsum is reclaimed from this bin by a 12-in. belt conveyor of 90-ft. centers, on a 20-ft. incline, which discharges into a gypsum feeding bin of 11 tons' capacity.

Finish Mill

The clinker from the 14-ton bin is dropped into a 300-bbl. Howe hopper scale, while the gypsum is weighed in a small bin set on a 500-lb. portable platform scale. The batch of gypsum is emptied into the batch of clinker, and the whole discharged into a hopper feeding elevator No. 9, which in turn discharges a 20-in. belt conveyor of 54 ft. centers, discharging into three steel



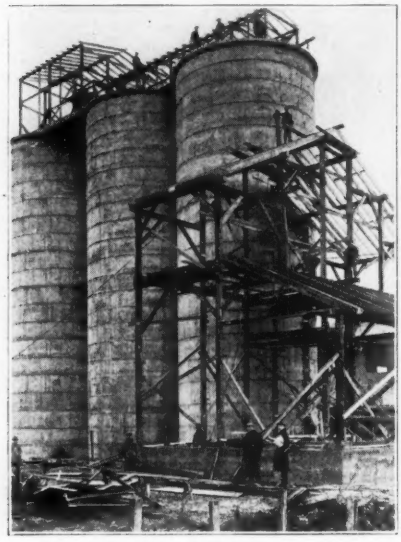
Kilns and coolers. Note concrete hood connecting discharge end of kilns and feed end of coolers



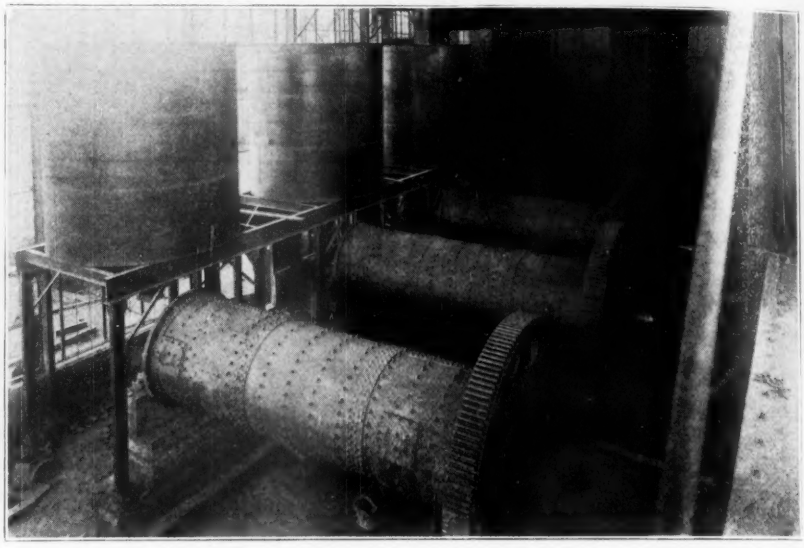
Layout of clinker and gypsum handling

tanks, 14-ft. dia.x15 ft. high and of 500 bbls. capacity each, over the compeb mills. The belt conveyor over these bins has the same tripper arrangement as the belt conveyor over the raw bins.

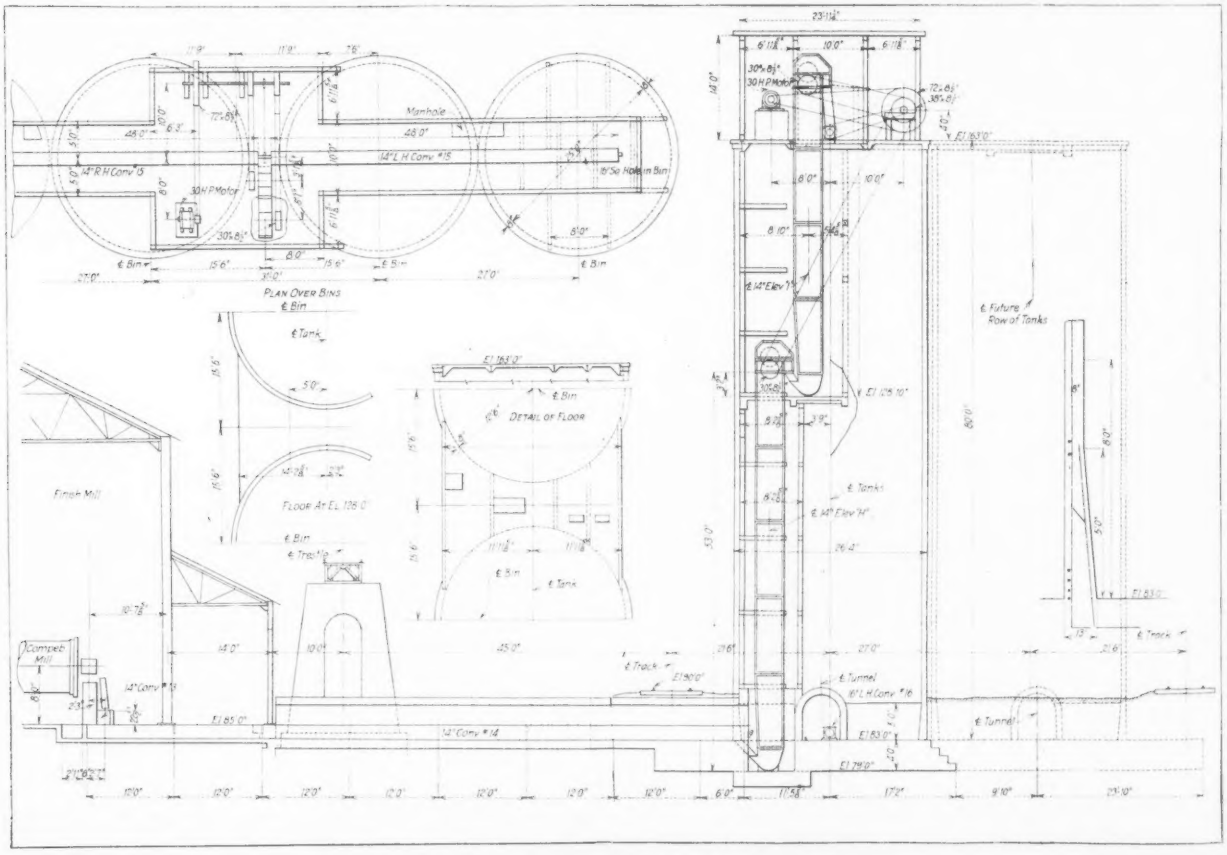
The material from these bins is fed into three compeb mills, of same type and drive as the mills at the raw end. The material from these mills is discharged into a 14-in. screw conveyor in a concrete trough setting in the floor. This conveyor is 72 ft. long and discharges into another 14 in. screw conveyor, 90 ft. long and set at right angles to it. This second conveyor leads to the stock house and from the finish mill to the stock house it is enclosed in a tunnel 5 ft. wide, 4 ft. 9-in. wide and 65 ft. long. The finished cement is then picked up by a series of two elevators, dropping into elevator No. 10 first, which drops the material into elevator No. 11. This is accomplished by a by-pass between the two elevators.



Concrete silos for finished cement



Finish mill. Clinker bins overhead feed end



Plan and elevation of conveyors and elevators to stock house

Storage and Packing

Elevator No. 11 deposits the finished cement into two 14-in. screw conveyors each 48 ft. long, one being right handed and one left handed, which distributes the cement into four silos, 25 ft. inside dia., and 80 ft. high, having a capacity of 9,800 bbls. each. The silos are of reinforced-concrete construction.

Through the centers of the silos longitudinally, is a tunnel 112 ft. long, 5 ft. wide and 6 ft. high, through which a 16-in. screw conveyor, 132 ft. long operates. This conveyor is so arranged as to be driven from either end, so that the finished cement from the silos can be conveyed to either of two packing houses, there being one on each side of the silos. The 16-in. conveyor discharges into a cross conveyor 48 ft. long, which discharges into elevator No. 12 depositing the material into a 30-in.x42-in. x8-ft. revolving rotary screen. As the cement is screened it falls into another 16-in. conveyor which takes the material to hoppers feeding two Bates 4-valve packing machines.

As the cement is sacked it is put on a 30-in. flat belt conveyor of 14-ft. 3-in. centers which takes the filled bags from the packer to cars on either side of the packing house. Both packing units are the same, and all together there are four packing machines, and four cars can be loaded at once. The packing houses are also provided with an Allis-Chalmers three compartment dust collector and the basement is provided with facilities for bag storage and bag cleaning.

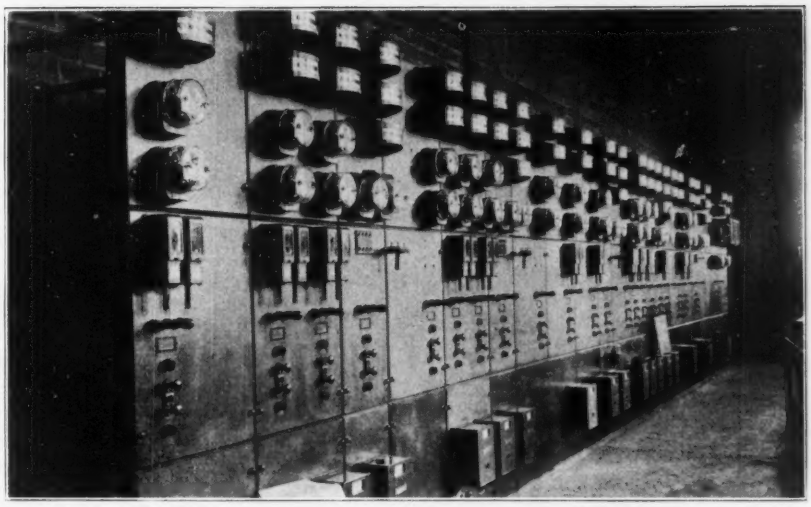
Power Plant

The power for all the plants is furnished to the company by the Pennsylvania and Ohio Electric Co., and is brought into the company's 2000-k.w. transformers at 66,000 volts, 3-phase, 60-cycle and is stepped down to 2300 volts. There are three transformers located outside the sub-station and a fourth for use in case of emergency.

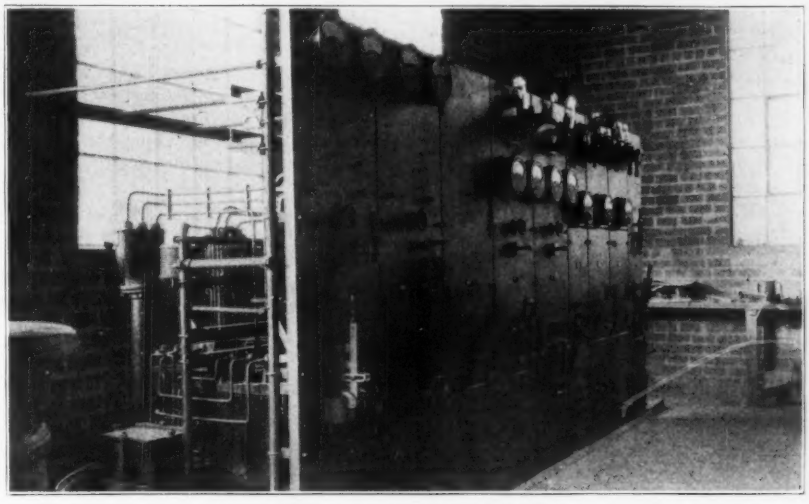
The sub-station was designed and built by the company with a view of continuous operation, and in this the company has one of the finest and most complete sub-stations ever built at any plant.

The 2300-volt bus bars enter the sub-station through a 15,000 V., 2000 A., oil circuit breaker provided with a by-pass, so that in case the entrance switch is out of order the energy will go into the bus bars without going through the oil switch. The bus bars are located in masonry compartments and each bar is made of 3 in. x 1¼ ft. copper. A horizontal disconnect switch sectionalizes the main bus bar.

From the main bus bar five 15,000 V., 800 A., oil circuit breakers feed to group bus bars in the lower feeder switch room. The first bus bar feeds the crushing and agricultural limestone plants; the second,



Alternating current switchboard



Direct current switchboard

Motor driven generators for direct current

the Metropolitan Brick Co.'s plants, and the remaining three feed the entire cement plant, being divided into units feeding the raw mill, coal mill and finish mill. In this way facilities for continuous operation are amply provided. The group busses are sectionalized by disconnect switches so that in the event of any one group switch being out of order, the group busses will be fed by either of the adjacent group switches.

The current from the group busses goes through 15,000 V., 400 A., feeder switches, direct connected by three conductor varnished cambrick lead cables to the motors in the plant.

The A. C. switchboard is provided with definite time limit overload relays, and the feeder switches with instantaneous relays which lock the feeder switches closed in the event of a short circuit on that switch, thereby forcing the 800 A. group switches to rupture all circuits. The A. C. switchboard panel is provided with ammeters, indicating wattmeters, curve drawing wattmeters, curve drawing power factor indicators, voltmeters and watthour meters.

The arrangement as described above makes it possible to keep a record of cost and consumption of power of every piece of equipment in all the plants, thereby simplifying cost-accounting greatly.

The sub-station is a two-story affair, the first floor being occupied by two direct-current generator sets, 152 k.w. each, being run by two 167 k.w. synchronous motors. For controlling this set a direct-current switchboard is provided. Direct current is used for exciting sychronous motors and magnetic clutches.

A total of 4800 h.p. is used throughout the plants. F. C. Jeannot, electrical engineer, is responsible for the construction work on this sub-station. The station was designed by Krippen & Funk, Engineers, Youngstown, Ohio.

Organization

The company has recently moved its general offices to Bessemer, Pa., and is now occupying a modern 3-story office building right in the midst of the plants. Because of the fact that it is an Ohio corporation, it also maintains offices in Youngstown. The basement floor is occupied by the chemist, C. J. Saeger, who has there a thoroughly modern and complete laboratory for making physical and chemical tests of the cement.

The company is fortunate in its location. It is served by the Pennsylvania Lines and the Pittsburgh and Lake Erie R. R. Being close to Pittsburgh, Youngstown, Cleveland and Akron, all good building centers, there will undoubtedly be a great demand for the cement, and the sales force is headed by Charles Schmutz, a man well known in the cement industry.

The officials of the company are as follows: John Tod, president; F. R. Kanengeiser, vice-president and general manager; Jos. G. Butler, chairman of board of directors; R. C. Steect, vice-president; G. G. Treat, secretary-treasurer; Chas. Schmutz, sales manager; R. J. Hawn, superintendent of cement plant; J. A. Johnson, superintendent of limestone operations; C. J. Saeger, chemist; W. D. Thomas, engineer, and S. L. Duvall, master mechanic.

Conditions in Lehigh Valley Cement District

THE TURN OF THE YEAR shows an indefinite aspect in the cement districts in the Lehigh Valley section of Pennsylvania. While some of the mills are curtailing, others which have been shut down for several weeks past are commencing to resume, and the evident intention is to accumulate just enough stock to provide for immediate requirements, as well as for any emergency. With a decline in quotations, and indication of further recession, the situation is not an encouraging one to the producer. Prices at New York have dropped to $3.80 delivered on the job, less bags, or $4.80 per barrel, including bags. The New Jersey districts and Philadelphia, Pa., are following closely in this line, with similar recorded reductions during the past few weeks. Of any eastern market, Boston, Mass., seems to be holding its own, and leading material dealers there are asking $5.50 a barrel, or without bags, $4.50.

The Atlas Portland Cement Co. closed its No. 2 mill at Northampton, Pa., on Jan. 3 for an indefinite period, throwing about 400 men out of work. The No. 4 mill of the company in this same section has resumed operations at the same time, following a curtailment of several weeks, giving employment to about 300 persons. At a special meeting of stockholders of the company it was voted to increase the capitalization from $14,000,000 to $23,000,000, the extra fund to be made in common stock, with shares increased from 110,000 to 200,000.

At Coplay, Pa., the Lehigh Portland Cement Co. has deferred the resumption of work at its local mill. Employes had been instructed to report early in January, as noted in the last issue of Rock Products, and on Jan. 3 announcement was made that no definite date had been decided for reopening. The Coplay Cement Mfg. Co. is operating at its mills B and C under considerably reduced production; several roasters and other departments are in service, but with much curtailed working force.

The Bath Portland Cement Co., Bath, Pa., has completed plans for the construction of a one-story and basement office building at its local plant, estimated to cost about $15,000. It is planned to inaugurate construction at an early date. In discussing the outlook for 1921, Fred B. Franks, vice-president of the company, says that there is every prospect that the cement business during the coming year will be good. A large demand is indicated by inquiries for good roads construction, he points out, as well as for some large buildings in New York and other cities and, most of all, from railroads. Before the war the railroads were the heaviest users of cement. A lot of work is also in sight in Philadelphia which will use up much cement from the Lehigh district, which manufactures one-third of the cement of America.

The Interstate Commerce Commission, Washington, D. C., has granted the Lehigh Portland Cement Co., Allentown, Pa., reparation in an amount of $21,065.73, with interest at 6 per cent from May 16, 1919, against the director general of railroads while under government control for unjust and unreasonable charges exacted for the transportation of several carloads of crushed stone from quarries to the company's cement mills at Mitchell, Ind.

Officials and office employes at Bessemer Limestone and Cement Co.

Practical Chemistry for Lime and Cement Manufacturers

XX. The Chemistry of Combustion—Excess Air Used in Burning

By Richard K. Meade, M. S.
Consulting Chemical and Industrial Engineer, 11-13 Fayette Street, Baltimore, Md.

ONE OF THE RECOGNIZED methods of improving firing conditions and securing economy of operation of lime kilns, etc., is by the study of the exit gases with particular reference to the amount of excess air used in burning. As I have said, simple apparatus can now be obtained for making flue gas analyses which any intelligent workman can handle. Still more simple apparatus can be obtained for determining the CO_2 only. Instructions furnished with either apparatus are ample for its proper use.

One of the chief advantages of making an analysis of the stack gases is to determine the excess air used in burning the fuel; that is to say, the air over and above that required by theory to properly and completely consume the fuel. This is found by comparing the nitrogen and oxygen shown by the analysis.

Practically all the nitrogen contained in the stack gases comes from the air used to burn the fuel—both from the air actually required to properly burn the fuel and the excess air above this. Coal contains a small percentage of nitrogen, but for practical purposes it may be eliminated from calculations of excess air. All the oxygen in the stack gases comes from the excess air, as the oxygen in the air actually used has combined with the carbon, hydrogen and sulphur of the fuel; consequently, if we calculate the oxygen shown by the stack-gas analysis the nitrogen is obtained by multiplying by 3.81 (since air contains 3.81 volumes of nitrogen for one volume of oxygen); the result will represent the nitrogen brought in by the excess air. The difference between this nitrogen and the total nitrogen will represent the nitrogen brought in by the air actually needed. The ratio between these two quantities of nitrogen will represent the ratio between the air in excess and that actually required by theory.

When the gas contains carbon monoxide, which represents carbon only partly burned, sufficient oxygen should be calculated to burn this gas. The amount so found is then deducted from the total oxygen shown by analysis and the difference calculated to nitrogen, since this oxygen is required by theory to properly consume the fuel and burn the carbon to carbon dioxide. Two volumes of carbon monoxide require one volume of oxygen for combustion.

Example: The gases from a boiler stack gave on analysis:

	Pct.
Carbon dioxide	11.5
Carbon monoxide	0.9
Oxygen	7.4
Nitrogen	80.2
	100.0

Find the excess air used.

Oxygen required for the carbon monoxide $= 0.9 \times 0.5 = 0.45$. Excess oxygen $= 7.4 - 0.45 = 6.95$.

Total nitrogen 80.2
Nitrogen in excess air $= 6.95 \times 3.81 = 26.5$

Nitrogen in necessary air 53.7

Ratio: $53.7 : 80.2 :: 100 : x$.

$x = 149.3$.

Excess air = 49% of air necessary for combustion.

Another problem along this same line is to find from a gas analysis the amount of air used per pound of coal. In order to do this, however, we must know the percentage of carbon contained in the coal. In making this calculation, we first calculate the weight of carbon represented by 100 cu. ft. of the stack gases and the weight of air corresponding to the oxygen. The former represents the coal, and the ratio between these two weights is the ratio between the carbon burned and the air used in doing this.

As has been shown, 1 lb. of carbon will produce 3.67 lbs. of carbon dioxide, or, since 1 lb. of this gas occupies 8.15 cu. ft., 29.8 cu. ft. of carbon dioxide. Similarly, it can be calculated that 1 lb. of carbon will produce 29.8 cu. ft. of carbon monoxide. For all practical purposes we may, therefore, consider 1 lb. carbon = 30 cu. ft. of either carbon monoxide or dioxide.

Now 2.67×4.33 or 11.56 lbs. of air are required to produce 29.9 cu. ft. of CO_2, or

1 lb. of air = 2.6 cu. ft. of CO_2.

Twice as much air is required to produce 28.8 cu. ft. CO as to produce CO_2, hence

1 lb. air $= 2.6 \times 2$ or 5.2 cu. ft. of CO.

Now, 1 lb. of air contains 0.231 lb. of oxygen occupying 2.6 cu. ft, hence

1 lb. air = 2.6 cu. ft. of oxygen.

If, therefore, we divide the sum of the percentages of carbon dioxide and carbon monoxide by 30, we will have the weight of carbon in 100 cu. ft. of gas; while if we divide the sum of the percentages of carbon dioxide and oxygen and one-half the percentage of carbon monoxide by 2.6 (or multiply by 3.85) the result will be the weight of air used to burn this carbon.

Example—Analysis of flue gas:

	Pct.
Carbon dioxide	11.5
Carbon monoxide	0.9
Oxygen	7.4
Nitrogen	80.2

Coal contains 85 per cent carbon.

Carbon in 100 cu. ft. $= (11.5 + 0.9) \div 30 = 0.413$.

Air to burn this $= (11.5 + 7.4 + 0.45) \div 2.6 = 7.44$.

Ratio of air to carbon $= 7.44 : 0.413 = 18.0 : 1$.

Since the coal contains 85 per cent carbon, ratio of air to coal $= 18 \times 0.85 : 1 = 15.3 : 1$.

Hence, 15.3 lbs. of air are used for each pound of coal.

In the case of gases from lime and cement kilns which contain carbon dioxide from the decomposition of the limestone, this method cannot be used. If we know the ratio of fuel and lime stone, however, we can tell. For example, suppose 1 lb. of coal will burn 1 lb. of lime. If the limestone contains 56% lime and 44% carbon dioxide, then for every pound of lime produced 0.78 lbs. of carbon dioxide will be driven off, or for 4 lbs. of lime 3.12 lbs. of carbon dioxide. Similarly, as has been shown, coal containing 85% carbon would produce 0.85×3.67, or 3.12 lbs. of carbon dioxide, so that half the carbon dioxide in the gases would be due to coal and half to the limestone. The calculation is then similar to the above after deducting the carbon dioxide due to limestone from that shown by the analysis.

(To be continued)

Action of Hydrogen in Flue Gases

THE ACTION of hydrogen in the volatile constituents of fuel is to increase the apparent percentage of nitrogen in the flue gases. This is due to the water vapor formed by the combustion of the hydrogen which will condense at a temperature at which the analysis is made.

Phosphate Washing Plant With Many Improved Machines

The Hoover-Mason Phosphate Company Has Many Specially Designed Machines

THE PLANT OF THE HOOVER-MASON PHOSPHATE CO., Mt. Pleasant, Tenn., which is a subsidiary of Hoover-Mason, contractors and engineers, Chicago, Ill., was designed and built by that company under their supervision. This plant, which is one of the largest in the Mt. Pleasant district, has possibly more machinery of original design than any other plant in the district. The mining methods have already been described in an earlier issue of ROCK PRODUCTS.

The rock phosphate is delivered to the plant from the mines in trainloads of 4-cu. yd. side-dump cars. These are emptied into a hopper which feeds a skip car raised and lowered on a cable incline.

One of the views shows how the cars are side dumped into the steel hoppers—the contents being washed down into a skip car which has the same capacity as the mine car. This skip fits snugly under the hopper so that its mouth and the bottom of the dump hopper are practically in the same line of contact.

While the locomotive is spotting one car over the dump hopper, the hoisting engine elevates the skip to the top of the incline and its contents are dumped into a crusher feed hopper. The skip is

Plant of Hoover-Mason Phosphate Co., Mt. Pleasant, Tenn.

Incline from car hopper to washer

Side dumping cars into steel hoppers

end dumped by depressing the forward wheels. This is effected by the rear wheels running on a different track of a wider gauge while the front wheels are run on the original track. As the car continues on the front truck dips, depositing the contents and when the cable is released the car is so balanced that it will come back up to its correct position.

Crushing Plant

The crushing hopper feeds a double set of roll crushers which are also of special design. This crusher has two functions—it reduces the material to less than ¾-in. and also regulates the flow of material through the plant to a uniform amount.

This crusher consists of two pair of rolls which are about 4 ft. long. The upper rolls are 36 in. in diameter and their faces are 4 in. apart. Immediately beneath this set of rolls is another set which is 24 in. in diameter and is set ¾ in. between the inner faces. The bearings are cushioned by heavy coil springs which enable the rolls to give when foreign substances are encountered.

Immediately under the roll crusher is a "mulcher" (scrubber), which mixes and stirs the phosphate, water, and any dirt which may be clinging to it. The mulcher consists of six arms which rotate between stationary arms so that the material as it passed down and through this machine is thoroughly washed and scrubbed.

Washing Plant

At the discharge of the mulcher, the material is emptied into an end discharging can washer which is 7 ft. in diameter. This washer is a metal cylinder with a number of cleats on the inside. It rotates on a slightly inclined axis and as the mixture of water and phosphate work its way the length of the washer, it is repeatedly lifted and dropped.

The lower end discharges into a second can washer 7-ft. in diameter and 30-ft. long. This can is supported on rope slings on each end and is partly immersed in water. The can revolves inside a wooden container box which has partitions which make the water flow through the can. The can is slightly inclined. The phosphate moves along the can due to the inclination and the water goes through the can in an opposite direction, thus giving a "counter-current" classification. On the end of the can is fastened a ½ in. screen. This separates the sand and the lump. The lump goes out over the end of the screen to a bucket conveyor and thence to a picking belt where mud-balls and flint pebbles are picked out by hand. Thence to a storage hopper.

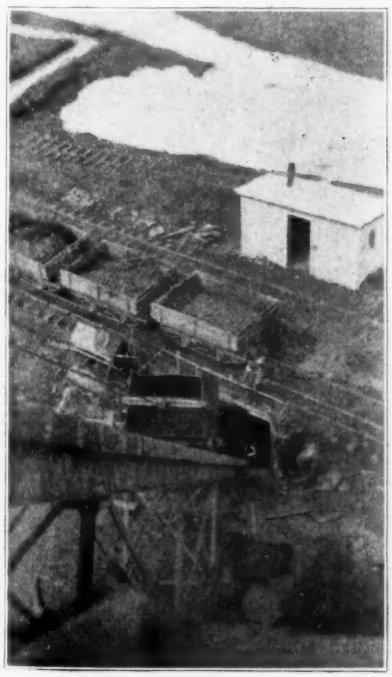
The sand which goes through the screen is conveyed by water jets to two 8-ft. diameter Allen sand cones. These sand cones discharge into a smaller "mulcher" where the sand receives another rubbing. From here it is fed into a 6-in. centrifugal sand pump and discharged into two more 8-ft. Allen Sand cones. The discharge from these is the final washed product.

The sand which is carried out of the can washer with the muddy water is diverted with the water into six 14-ft. diam. Allen sand washing cones. Here the muddy water is roughed off and sufficient settling area provided to catch the fine phosphate sands. The discharge from these cones is carried by means of a button conveyor to the smaller "mulcher" mentioned above and mixed with the coarse sand product and receives the same treatment.

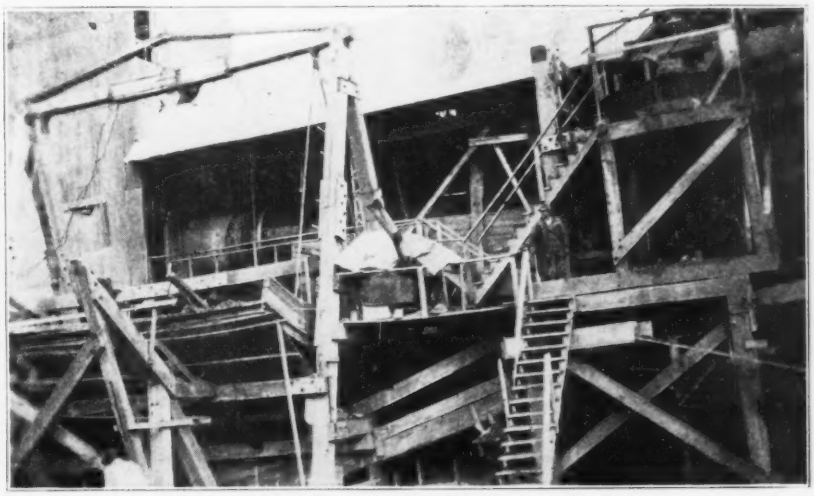
The sand and rock phosphate, after it has been drained in cylindrical tanks, is loaded by gravity into a second skip car which is exactly like the one used on the first incline and the material is fed to a hopper over the driers.

A specially designed dump chute is used to distribute the wet phosphate over

Trainload of raw material



Unloading the cars



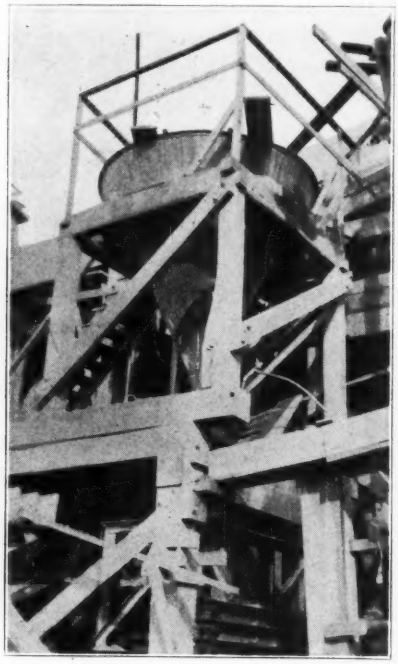
View showing "can" washer and Allen cone

the entire area of the retaining hopper and the driers are fed by mechanical drum feeders so that the feed is constant at all times.

The wet product is fed into the hot end of the driers and the dried phosphate taken from the cool end in a drop bottom skip car and delivered to the storage house where it awaits loading.

Personnel

The main feature of the plant is the continuous flow of material which is well illustrated by the view of the plant. The Hoover-Mason Phosphate Co. has a



Allen sand washing cone

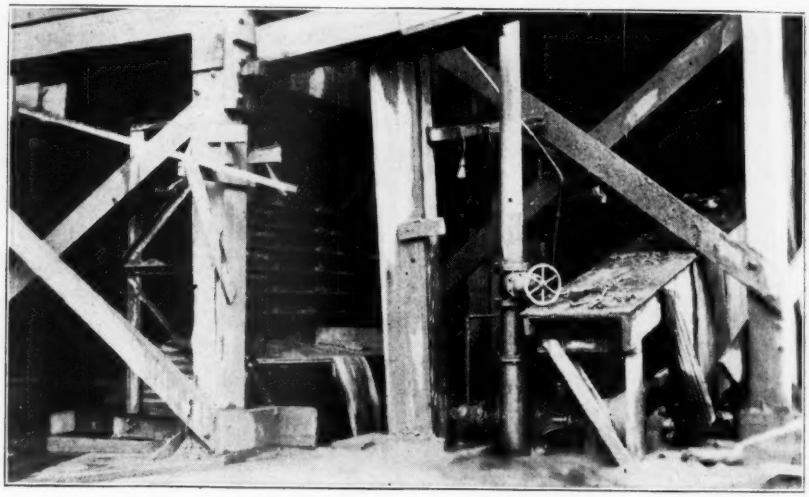
yearly capacity of 80,000 to 90,000 tons and is one of the largest washing plants in the central Tennessee district. The officers of the company are F. K. Hoover, president; A. J. Mason, vice-president; H. E. Hoover, treasurer; E. K. Scott, secretary; R. P. Hoover, general manager; and W. S. Mabee, superintendent.

Phosphate in Palestine

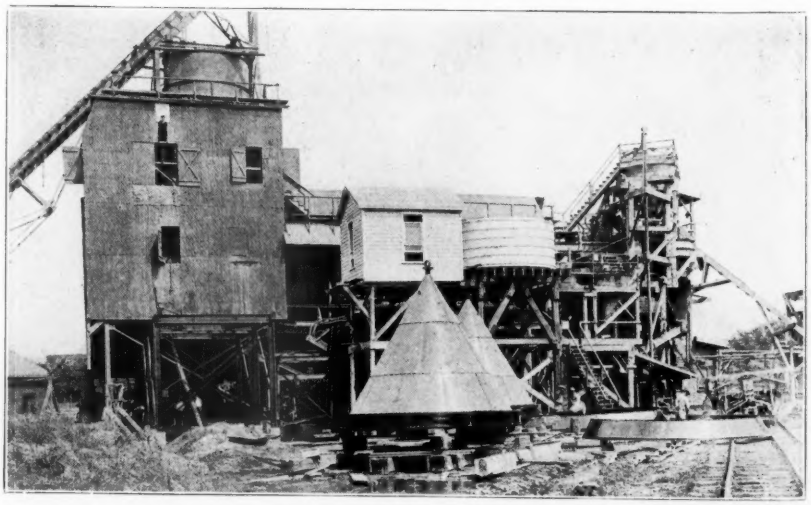
PALESTINE has extensive beds of phosphate, which difficulties and high costs of transportation will prevent from becoming an article of export, but which will produce a supply available for domestic use and eliminate the present large imports of fertilizers, according to a report in Palestine, the official publication of the British Palestine Committee.

The phosphate beds are found east of the Jordan and in the desert of Judea. Several attempts were made by English, Italian and Turkish companies to exploit the fields before the war, but difficulties of transportation forced them to give up their projects. Plans are now on foot to develop the local beds for domestic consumption.

Material being delivered to storage



Sand mulcher and centrifugal pump



General view of plant, showing new Allen sand washing cones ready to be erected

Status of the National Agricultural Limestone Association

Report of C. R. Wagner, Field Representative, National Agricultural Limestone Association, at Annual Meeting

IT IS a good idea, at times, to stop, and in the words of the Missouri congressman, ask where are we at? In other words, get our bearings.

The Past

There is an old saying that "The grist will never be ground by the water that has already gone over the wheel." It is practically useless and I do not care to consume time in recounting ancient history. "What is written is written." Permit me to say, however, that a half century's experience has taught me that great expectations are not always realized. "Bobby" Burns was right when he said "The best laid plans of mice and men aft gang aglee."

Our expectations, with reference to the things we had hoped to see accomplished in the workings of the National Agricultural Limestone Association have not all been realized. But as this is the common lot of all, that more or less of our plans and expectations should fail, it would not be becoming in me to complain; nor do I do so.

The Present

January 1st, 1921, found the National Agricultural Limestone Association rather a healthy youngster, although but two years of age. It is hardly fair, nor could we expect a father to say aught against his offspring, but here is what the first president, under its present reorganization, J. C. King, of the Carbon Limestone Co., has to say: "It is certainly gratifying to look back over the year that is now drawing to a close, and review the work that has been done in the National Agricultural Limestone Association. The work has progressed wonderfully and I believe that inside of another year, the manufacturers who will be on the outside of this organization will be negligible."

Again let me quote from a recent letter from our chief executive, F. R. Kanengeiser, of the Bessemer Limestone and Cement Co., who is equally optimistic. "Am certainly pleased to see the enthusiasm which the St. Louis meeting seems to have stirred up, for the interests of the National Agricultural Limestone Association. Am pleased to return congratulations for the splendid growth of the Association."

From the general tone of correspondence received, from not only the members but from many yet on the outside of the organization and a personal assurance from many sources, is that the Association is beginning to function.

While our membership *has* materially increased and while no doubt *some* favorable results have been obtained, yet we must admit that the results are far short of what *can* be accomplished, and the objective we have in view. Past blessings will not suffice, in this particular case.

The Future

The future can only be conjectured. It is a personal obligation upon every member of the Association, as to how big the Association shall be, how efficient we shall become, how fully it shall function. With the same spirit of helpfulness as shown by our president and ex-president, our stature and usefulness should materially increase. Our president further says, under date of Dec. 14, "I will be very glad indeed to write a personal letter to all producers of agricultural limestone in our territory; in fact, will be pleased to send out a letter to any of the district organizations which you might suggest."

C. R. Wagner
Field Representative, National Agricultural Limestone Association

Gentlemen, you are, or at least should be, the most interested in perfecting a 100 per cent organization. What does 100 per cent functioning really mean? Again do I take the liberty of quoting from the correspondence of our ex-president, Mr. King, which may convey to you some idea of what 100 per cent functioning might mean.

Mr. King in commenting upon recently released statistics from the Census Bureau gives us this interesting data, "The total number of farms in Ohio on Jan. 1, 1920, were 256,695; total number of acres under cultivation, 1919, were 13,152,382; value of farm crops produced from the above number of acres was $1,214,085,671; and the average given above does not include the ordinary small garden patches and that which was planted in small fruits.

During the year 1919, there was approximately 3,000,000 acres in wheat, and if we assume that each acre should have been covered with two tons of ground limestone, it would have required 6,000,000 tons of agricultural limestone to have supplied the demand of the farmer. Cut this figure in half and we have a demand that is greater than the capacity of all the plants supplying the state of Ohio. Cut this figure in ha f again and you have an amount that would tax the capacity of all the plants."

And he goes on to say that "the question in my mind is, what shall we do to increase the demand for agricultural limestone, considering at the same time, that this demand is naturally increasing from year to year, and what can we do to keep pace with the increased demand when it is necessary that a portion of our production, and I assume that it is true with other manufacturers, is distributed in other states?"

Perhaps some of you suspect that these figures are far-fetched and that Mr. King is drawing upon his imagination. For your benefit, let me say that wise men have long held that truth is stranger than fiction. While Mr. King may be several years in advance of the actual occurrence of the conditions as recited by him, let me give you some things that are actually taking place.

Six counties in Indiana, viz., Vigo, Sullivan, Clay, Putnam, Park and Greene, in connection with Purdue University, have made a careful soil survey in those counties, of conditions as they do *now* exist. No guess work remember. And at a meeting held recently in Terre Haute, to which I had a special invitation and which I attended, the following statements were made upon authority.

1st—Practically all the lands in these

counties, are acid and badly in need of this soil sweetener.

2nd—That men can and have traveled forty miles in one direction and not a clover field in sight.

3d—That it would require, as an initial application to correct undesirable soil conditions and create conditions that would insure profitable crop production, 2,000,000 tons of ground limestone. Remember, please, I said *initial* application.

The investigation further showed that only about 15,000 tons had been used in the last five years. Only one ton used, where 100 should have been used. A representative of the Mid-West Quarries Co., Mr. Taylor, after some rapid computation, remarked that it would take their company, working at full capacity, between 200 and 300 years to supply this demand. Let me here add, that it is not the intention of the county agents in those counties, to lay down on the job, but a plan is under way in which your Association is asked to assist to its ability, in which a campaign will be inaugurated to put this two million tons *on* the land.

On Jan. 13 at Zanesville, O., will be held a very important meeting to which your field representative has been urged to be present. A new crushing and grinding plant has begun operations (Columbia Chemical Co.). They are on a study as to whether the demand will justify grinding for agricultural purposes. Their output would be something like two carloads daily of agricultural limestone. The meeting above referred to will be that of the county agricultural agents in seven counties, with Zanesville as the center, for the purpose of devising a working plan whereby this entire output, about 30,000 tons per year, can be guaranteed to the new plant. Following is the plan as proposed by Mr. Wiley, county agent for Muskingum county:

That the seven counties apportion the 30,000 tons (Mr. Wiley says that Muskingum county ought to use that much alone) that each agent will then go back to his respective county, to each of his farm bureaus and shipping points, dividing his county's allotment among these various points and at the same time putting on a campaign that will absorb that amount and possibly much more. Arrangements will also be made whereby a stipulated amount must be taken each month in the year, either by direct hauling, shipping or storage bins.

Future Preparations

To effectually meet these growing demands, as foreseen by the careful observer, to properly guide and guard a most promising industry into safe and sane channels, is no fool's job, or at present a solved problem. The way is new and there are no blazed trails to follow. Mistakes will be made, steps must be retraced and detours made before the end is reached. You must assume business risks and submit to business losses in order to reap business profits. You must have more faith in the honor and honesty of your fellow producer, and in the ability of an association of such producers. Here is the crux of the whole thing, as I see it. Thorough organization is highly essential to success, for the following reasons:

1—By thorough organization and co-operation and by the united effort of all, you can and will obtain the *desired* results.

2—You are *now* face to face with organized consumers; and if those organizations be permitted to play both ends against the middle, you will in the end be holding the bag.

3—By properly and honestly organized effort you will be in much better shape to effectively do team work with the organized consumer, which in the end will be to the benefit of both.

After careful consideration I sent you last May an outline of a plan that I thought would be effective. At the same time asking for suggestions and criticisms. A few made valuable comments, but the major portion of the membership passed it up as an idle dream, I suppose. Since then events have transpired to partially shape our destinies in that direction. Indiana producers have expressed a desire for united and allied action. Illinois producers have signified a willingness to co-operate. Missouri producers have an organization perfected and splendid backing in the agricultural forces of the State. Ohio producers have their decks cleared and ready for action. The Southern group have their organization in action and expressed in a recent letter that they hoped to soon be in shape to affiliate with the National Association.

Local Groups

Upon these local groups must rest the responsibility, very largely, of direct, active and effective service. One of their first duties should be to strengthen their organization by adding as many of the producers within their territory yet at present not members. This is why we have strenuously advocated a field representative, on duty the entire time. There is opposition to this because of the added expense. At this particular time, the pendulum is passing from extreme extravagance to extreme conservatism in expenditures. Perhaps this is one of the laws of economics and we may expect it. Advanced agriculture has decreed that it will be wise to have a paid man on the job in every county. I am just wondering whether or not the once despised stone (the farmer) will not in the end find its place as the real corner.

There is a saying, and with a considerable degree of truth, that "We usually get out of a thing what we put into it." I am somewhat fearful that if you make these local groups simply social bodies that you will, having put little in, take little interest in them, expect but little of them and consequently will get but little out of them. And I here and now forecast at least a partial miscarriage of desired results in those groups where this provision is not made. I would, however, make this proviso, that if in your combined wisdom you deem it unwise, at this particular and possibly inopportune time, to thus organize, that you seriously consider, at your earliest opportunity, such action.

A National Organization

There may be a diversity of opinion as to the necessity and advisability of a national organization. So far as I am able to discern it is highly essential to success and especially so at this particular time in the readjustment of business. It is a systematic means to an end. A national organization need not and should not be administered so that it will be a burden to any single member. Co-operation cannot, nor do we wish it to overcome economic laws.

There are at least seven definite and distinct headings under which a national organization might well function and your National Association will be no exception. They are as follows:

1—Legal requirements. There will arise legal questions in the business, but as a rule, many of these are alike common to all and can be handled from one common source and at less expense.

2—A statistical division. Here is important work, yet too often neglected. Many of these are alike common to all and can be gathered and used by all.

3—Publicity and advertising. There is absolutely no question what can be raised here. One needs but consider the enormous sums paid by old established associations, for campaigns of advertising, that no one concern would dare undertake, yet it means much and is an every day occurrence with large associations.

4—Legislative matters must be considered as long as legislatures meet and as long as legislators are human beings. Matters pertaining to this phase of your business can best and ought to be handled from a common source and with far less expense to individuals.

5—Freight rates are, and will continue to be, a determining factor in the development of your business and here is where collective bargaining will get results that can be gotten in no other way.

6—Again it can and should be used as a common clearing house for giving and getting a common store of information.

7—An association can and should mean a vehicle whereby and whereon could be collected and delivered the greatest pos-

sible load of persuasive and effective argument.

In all matters of general interest and importance thus the expense can and ought to be more widely and evenly distributed among the many.

Future Promotion

Future promotional work ought to be provided for and your attention should be called to the necessity of continuing promotional work in those states that appear ready, yet are not on your membership roll. In proportion to the increase you make here, you can take more aggressive action or lessen the expense to individual members. No one will question for a minute where this responsibility should be placed.

To the local group, will fall the duty of convincing those who are yet outside of the fold, yet within the boundary line of their respective group territory, that it is to their interest to join hands and work in co-operative harmony to gain desired ends.

Eternal Vigilance the Price of Success

And finally, let me add that there will be those who, through lack of vision, will endeavor to persuade you that in necessary retrenchment expenses, your Association effort so far undertaken can for the time being, be either discontinued or at least slowed down. This would look to me like a short-sighted, if not a suicidal policy. I would much rather try to persuade you to more carefully scrutinize every intended expenditure, to council and try out by the yard stick of brains each avenue of procedure. In all of your deliberations remember that you are not working for the year 1921 alone, but rather laying the foundation for an industry that will last long after you and I are dead and forgotten.

Free Haulage for Agricultural Limestone

A GROUP of Southern railways have printed a bulletin which announces that they will haul and deliver agstone to county agents and refund or remit on same all freight charges over their lines providing the county agent in the county in which the agstone is delivered will certify that the agstone so shipped will go direct to the farmer who uses it instead of going to the county agent, then to some broker or middleman or dealer in the business.—Bulletin of the National Agricultural Limestone Association.

California Freight Rates Cut

NEW FREIGHT rates on rock, gravel and sand between points in Southern California became effective Dec. 18, 1921, following conferences between sand and gravel shippers and the Southern Pacific, the Santa Fe, the Salt Lake, and the Pacific Electric railroads. The State Railroad Commission has authorized these new rates. These adjustments mean that the rate into Los Angeles from the principal producing points in this vicinity will be lowered about 10 cents a ton.

The Immigration Problem

Rock Products Producers, Through Their National Associations and Individually, Should Be Vitally Interested in Its Solution

AS EMPLOYERS of a very considerable number of immigrant laborers, the quarry industries are most certainly vitally interested in whatever action Congress may take to restrict or limit immigration. Both individually and through their national trade associations the men in the rock products industry should have some say in the disposition of this question.

The Inter-Racial Council, of 120 Broadway, New York City, whose avowed objects are: To promote Americanism; to improve the relationships among races in America; to stabilize industrial conditions; to develop policies, standards and legislation upon immigration and emigration; to apply American business methods to the foreign language press by building an American advertising base under it and securing supplies and credit for it, has issued the following statement in regard to the various bills now awaiting Congressional action:

"Immigration is not a question to be determined by the special interests of any group of labor or capital, as it is the welfare of the whole country that must count. It is not a matter so much of restriction as of selection. This is only part of the story. Proper distribution, assimilation and naturalization, all are parts of any constructive legislation. It is not difficult to make plans for these things, but it will take not less than a year to make the necessary provisions to carry them out; for example, any proper selective method will require officials abroad, and that means that arrangements would have to be made with other countries to permit them to make investigations.

"Of the bills that have been introduced in the Senate on immigration, one especially deserves mention, because its author, Senator Sterling, has been considering immigration, not from the single aspect of exclusion or restriction, but from other aspects as well; whether the particular clauses are accepted or not, it is encouraging to find proposed legislation which considers some aspects of immigration besides restriction.

"Among the important features of the Sterling bill are the following: It turns over the control of immigration to an immigration board, of which the chairman will be the Secretary of Labor, which board will have general control of immigration matters. This board, through its agents abroad, will investigate all impending immigration, and will inquire into motives inducing immigraton of particular persons or peoples, after negotiations with foreign states; the board will report on the amount of unemployment and the kinds of industries in which there is a labor shortage, together with the kind of immigration desired, such information to be obtained from the various states—the board must analyze the number of aliens admitted annually according to ethnic groups, the number of those naturalized each year, and the number of American-born children of foreign parents; finally, the board is to prepare booklets in English and foreign languages on the rights and duties of aliens, and these will be distributed among the immigrants. These provisions will permit a much closer investigation into the character of all immigrants who come, and will provide a method of distribution.

"There are important provisions in the Sterling bill that will challenge disagreement and criticism. Chinese, Japanese and other Orientals who have hitherto been specifically excluded are not molested, although the Board of Immigration has the right of excluding non-assimilable groups. All those who are resident here who comply with the laws have the right of naturalization; the proposed law, therefore, permits Asiatics, hitherto excluded, to become American citizens; the only transients admitted are of specified occupations, and not those usually classed as laborers; not more than 10 per cent of any race is admitted, the basis of estimate being the number of naturalized citizens of one race or country, and the number of their American born children; not more than three-fourths of 1 per cent of the total population to come from any single group in one year. Another clause which is distinctly new, and suggests that we may yet have to duplicate the police methods of European countries, is one which requires registration of all immigrants annually with payment of fee therefor.

"Two other bills have been introduced in the Senate, but they consider only the question of restriction: S. 4627 introduced by Mr. Dillingham, limits the number of aliens to any nationality which may be admitted to the United States and its dependencies in any fiscal year to 5 per cent of the total number of persons of such nationality already resident here. S. 4671, introduced by Senator Overman, prohibits all immigration for the period of five years."

Investigation of Railroad Car Bribery

Every Effort to Be Made to Abolish Trainmen's Custom of Holding Up Shippers for Tips

AN INVESTIGATION of the use of bribery to effect the distribution of railroad freight cars is now being conducted by the Interstate Commerce Commission.

Certain persons, firms and corporations are alleged to have offered or given money to employees of common carriers, or to Government officials entrusted with the execution of priority orders, to obtain cars when there was apparently a shortage. The discrimination that resulted occasioned complaints that prompted the investigation.

Transportation congestion was taken advantage of by profiteers who, according to officials of the Wholesale Coal Trade Association, bribed trains crews to switch cars to certain mines above the number these mines normally would receive, or bribed the crews to cut out loaded cars contrary to routings, and at times when non-bribing shippers and consignees could not get switching service.

But the use of bribes to get cars has been found in many other industries. Farmers' organizations have protested to the Commission that discrimination in the distribution of cars prevented a just movement of wheat and other crops, and of live stock. The National Industrial Traffic League has taken vigorous action to stop all such bribery, and the railroad companies, notably the Pennsylvania System, are co-operating.

The temptation, during a car shortage, to obtain cars by gifts of money to employees, or officials, has been yielded to by manufacturers, mine operators, grain and cattle shippers, and others, but it manifestly has upset the normal flow of commerce, penalizing the many for the benefit of the few, and being in a large degree responsible for profiteering. There is no evidence that bribery has been used by a large number in any industry.

The Department of Justice is also investigating the practice, and, so far as it is found in the coal industry, the Government is being aided in its efforts for clean business by the National Coal Association. The following statement was made by authority of Col. D. B. Wentz, president of the Association.

"The National Coal Association in conjunction with the Attorney General, has been aiding so far as it could, in assembling data as to all abuses of which it could obtain information, to the end that the Attorney General might be able to proceed against the offenders. The Association stands against graft, extortion and all other evils in the shipment of bituminous coal, and has made a consistent fight against them throughout the recent coal shortage emergency."

The Philadelphia "Public Ledger," of November 12, reported one phase of the situation as follows:

Before the Eastern Ice Manufacturers' Association, in convention here, Anthony J. Volk, of Hoboken, head of one of the largest ice producing syndicates in Hudson County, injected the charge of graft into the bituminous coal controversy.

"We had to submit to sandbagging and pay the profiteers whatever they chose to demand, or shut up shop," he said. "We concluded to pay any price to get fuel rather than let the people suffer for lack of ice. They made us pay as high $21 a ton for some of our fuel.

"To summarize the situation in this State, we complied with every order issued by the Interstate Commerce Commission and with all of the instructions of the railroad companies, and the net result has been an overcharge, to ice producers alone, of $15,201,000."

The New York Board of Trade and Transportation on November 10, adopted resolutions commending the Pennsylvania System for its stand against bribery, and demanding a clean-up of the practice generally.

Standardization of Sand and Gravel Held Impracticable

CONSTRUCTION materials and equipment figure in a recent study of standardization conducted by the Fabricated Production Department of the Chamber of Commerce of the United States. The object of this investigation was, first, to ascertain the work done by the organizations, and secondly, the methods used, if the similarity of practice made it possible to supply the experiences of the successful organizations to those desiring to obtain similar results.

Regarding sand and gravel the report states: Sand and gravel has been standardized as to sizing and gradation in the representative market territories. It has been found that characteristics of materials vary so largely in different localities that uniformity over a large territory is impracticable.

Urge Early Filing of Income Tax Returns

WASHINGTON, D. C.—Extensive plans for aiding taxpayers in filing their income tax returns for the year 1920 are being made by the Bureau of Internal Revenue. Revenue officers will visit every county in the United States to assist in making out the forms, and the services of Government experts heretofore offered to city residents will be continued.

Forms for filing returns of 1920 income will be sent by collectors to persons who filed a return for last year. Failure to receive a form, however, does not relieve a person from his obligation to file a return within the time prescribed by the law. Copies of the forms may be obtained from offices of collectors of internal revenue, branch offices, post offices and banks, and efforts will be made to have them ready for distribution by January 1.

The period for filing returns is from January 1 to March 15. The tax this year, as last, may be paid in full at the time of filing the return or in four installments, the first of which is due on or before March 15, the others on or before June 15, September 15 and December 15, respectively. The first installment must accompany the filing of the return.

Officials of the Bureau of Internal Revenue are urging taxpayers not to delay in the filing of their returns. Merchants and business men are now casting up their accounts for the calendar year 1920. With the facts and figures necessary to make a correct return fresh in their minds, the making out of a form soon after January 1 will be an easier task, it is pointed out, than if delayed.

The requirements of the revenue act relating to returns for the year 1920 are the same as those for the year 1919, and only a few minor changes have been made in the forms. The normal rate of tax for 1920 is 4 per cent on the first $4,000 of net income above the exemption, and 8 per cent on the remaining net income. The surtax rate, which is computed without the benefit of the exemption, ranges from 1 per cent on the amount of net income between $5,000 and $6,000 to 65 per cent on the amount of net income in excess of $1,000,000.

Cement Scarce in Australia

THE SHORTAGE of cement is causing a slack period in the building trades and consequently considerable unemployment. America and New Zealand have placed an embargo on the export of cement, and the Government of New South Wales has been in communication with Java and every other cement producing country. The price, however, in those places has been prohibitive.

Editorial Comment

Presidents and Executive Officers of Some of the Biggest Railway Systems Tell Rock Products Their Attitude on Sand, Gravel, Crushed-Stone and Slag Business

EVIDENTLY the letters the editor of ROCK PRODUCTS wrote to a few of the most prominent railway executives were opportune, for one of those railways has already taken the initiative and has started an investigation of the actual effects of the recent railway rate increases on the quarries and gravel pits along its lines. As was pointed out in our last issue, every one of the railway executives addressed has expressed a willingness to meet his shippers half way.

Eastern Railway Has Revision Under Way

E. J. Pierson, president of the New York, New Haven & Hartford R. R., has written:

"So far as rates upon sand, gravel and rock in New England are concerned the tariffs are now under review with a view to establishing by the opening of the season next year a uniform and consistent scale of rates designed to permit development of the business where it may be found that existing rates are too high for that purpose.

"It has not been possible, on account of the many rate changes and complications, falling off of business, etc., since the increases of August 26 were established to give this subject the consideration it perhaps merits, but our traffic department contemplates completing its review in time to establish such readjustments as may be found proper for the 1921 season of business."

Strict Zone System Impracticable

C. E. Spens, vice president in charge of traffic of the Chicago, Burington & Quincy R. R., states briefly but clearly the point of view of apparently the majority of railway executives when he writes:

"Our business is to sell transportation, and to make our prices higher than the buyer will pay, in other words, higher than the traffic will bear and move freely, would, of course, not result in sales. We, of course, are entitled to a fair profit on our transactions the same as any other industry, and in view of the public character of our institution we could not afford to make unreasonably low rates which might in turn jeopardize our rates on other traffic.

"I do not think the time will come when we will be compelled 'to charge a fixed price for a certain service under any and all conditions.' In other words, I do not believe, for instance, that the same mileage scale might be established on crushed stone hauled fifty miles in Pennsylvania as might be established for the same haul in the State of Nebraska. But it is quite possible that a mileage scale might be established to apply uniformly in the same district or zone under substantially similar transportation conditions, but even then it might be necessary to vary occasionally from a scale fixed for a particular zone due to some local competition that might require especial consideration. *Strict application of a rigid rule or rate basis in a given territory on any commodity is impracticable.*"

Why the Zone System Is Impracticable

The advantages of the mileage zone system of rates and some of its disadvantages were discussed in the January 1 issue of ROCK PRODUCTS at some length. It is impracticable, as nearly all the railway executives agree, because it does not take into account such competitive conditions as must be preserved for the good of the industry as well as in the interests of the public welfare.

The straight mileage zone system of rates is impracticable from the railway point of view because it does not take into account ordinary *business* considerations. For example, take a producing plant 12 miles distant from a large terminal consuming center like Chicago. We will say for the sake of argument that the freight rate on a car of crushed stone to a siding in the city is 50 cents per ton.

A car of stone leaves the plant on a Monday morning and reaches the city terminal classification yards on the same day. Possibly 10 days elapse before the car finally works its way through a complicated terminal system to the consignee's siding. He unloads it within the specified time and the car is returned to the plant, consuming in the round trip two weeks, or 14 days.

The railway received for the use of its car, the cost of transportation, etc., the sum of $25 (50 tons x 50 cents), or something less than $2 per day.

Suppose the same plant ships a car of stone to a contractor 90 miles down the state in the other direction. The car leaves the plant on the same Monday by a local freight and is dropped off at the siding the following day. The contractor unloads it within the specified time and the empty is picked up by a local northbound freight on Thursday or Friday and set in on the stone plant siding Saturday of the same week.

Suppose the railway gets only 50 cents a ton for this 90-mile haul. The car has taken a week for the round trip. It has netted the railway company $25 for seven days or less, or just double what the car that went to the city earned. But in both cases the freight rate was the same.

This illustrates, possibly, as well as can be, why car-mile earnings and ton-mile earnings do not mean much, and why there is no real *business basis* for a mileage-zone basis of rates—most certainly not a zone system in which the producing plant is the center.

Accident Prevention

Belts and Belt Guards

Prepared for ROCK PRODUCTS *by the Engineering Department of the National Safety Council*

BELTS must be reckoned among the industrial appliances which have occasioned a great number of serious accidents. Attention cannot be too forcibly called to precautions which should be taken in the management and safeguarding of these dangerous appliances.

Leather belts are in general use, except in situations where there is an excess of moisture, heat, grit, or other exceptional conditions.

Strength

Engineering manuals indicate a strength of 2000 to 5000 pounds per square inch for solid leather belts. This may be reduced at lacing or joint, even if well put together, to about 1000 to 1500 pounds.

The ordinary type of belting cannot safely stand a temperature higher than 130 degrees F.

Working Loads

The safe working load may be learned from manufacturer of belt and this load should never be exceeded.

Tension

Belts should be adjusted to tension under conditions as closely approaching normal as may be devised. In damp or rainy weather belts are liable to stretch. This fact should be considered in computing tensions in new adjustments.

Countershafts with adjustable hangers are advisable for new installations.

Length

Average distance between shaft pulleys for small belts should not exceed 15 ft.; for larger belts, not to exceed 25 ft., and for main belts on large pulleys, not to exceed 30 ft.

Splicing and Lacing—Endless Belts

A general rule in many large plants reads about as follows: "Endless belts should be used wherever possible; in case endless belts cannot be used (and the circumstances permit), then the belts should be laced with rawhide or leather lacing. Belt hooks or metal lacing should not be used except where absolutely necessary in emergencies.

The objection to the use of metal in joining belts is its probability of presenting sharp projections which will injure hands or catch clothing. For this reason if such lacing is used at all, special care should be taken to see that it is not used in a situation where the hand or clothing are likely to come into contact with the belt.

Cementing and Splicing

All authorities agree that splicing and cementing are safer than any other method of joining belts. Claim is also made that belts joined in this manner will wear longer, cut labor cost, do smoother work and give better service.

Ends of belts should be carefully scarfed down, covered with cement, and firmly pressed together. It is essential that the work be carefully done by experienced workmen. The scarfing should be so arranged that the pulley where slipping is more likely to occur (i.e., the smaller pulley), will tend to smooth down the scarf end against which it rubs in the event of a slip, instead of tending to roll this end up.

Vulcanizing, with stepping splice, is recommended for rubber belts.

Lacing

When the belts are laced, rawhide or leather lacing is recommended. Ends should be cut short down to the belt and care should be exercised to avoid broken turns.

Belts usually weaken and break near the lacing. To avoid weakening belts too much, holes for lacing should be made with oval punch, with the longer diameter parallel to sides of belt. If the width of the belt will permit, edges of holes should not be nearer than ½ in. from sides nor less than 1 in. from ends. The second row of holes should be staggered and about same distance from first row as first row is from end of belt to be spliced.

Square the ends of the belt, if cut. Start lacing from the center, lacing both sides with equal tightness. Do not cross lacings on side running next to face of pulley. Keep ends of belt exactly in line while splicing.

If practicable, lacing should not be done while the machinery is in motion and the beltman should be protected against the accidental starting of the machinery preferably by locking the controlling device. When the line shaft cannot be stopped, special precautions should be taken to prevent the belt coming into contact with the pulley or wrapping on the shaft by the use of a belt perch or other attachment.

Wire Lacing

The use of rawhide or leather lacing is advocated in preference to metal lacing. The danger from wire lacing arises from two principal sources: The working out of the clinched ends of the wire and the ragged ends produced by a fracture. If the wire lacing must be used, it should be in some form of spiral continuous wire stitch, so that there will be only two clinching points to turn into the leather on each end of the belt, the two lacings being hinged together. Wire lacings, unless machine made, require a high degree of skill. Care should be taken that the wires lie below or flush with belt surface and not touch on pulley.

Single wire lacings, without hinge, should be used—if at all—only over large pulleys.

Lacings made of separate wire staples, pressed in, with or without the use of a hinge, are particularly objectionable, because the wearing of the belt on the pulleys tends to throw the clinched ends out. Their extreme sharpness constitutes a particular danger.

Toothed Clinches

Heavy toothed clinches of the so-called "alligator" type are less dangerous than the wire lace or wire staple type, partly because of their weight and strength and partly because the clinched ends run on the pulley side. The best types have a double grip.

Rivets

These connections offer the possibility of ragged ends on the opened rivet.

(To be continued)

Building Operations in 1920 and Forecast for 1921

The F. W. Dodge Company's Review of Building Activity

THE AMOUNT of money involved in construction contracts during 1920 in the twenty-five northeastern states of the country was practically the same as in 1919, according to statistics compiled by the F. W. Dodge Company. On account of greatly increased construction costs, this amount of money, something over two and a half billion dollars, paid for a volume of construction that was nearly one-fourth less in 1920 than in 1919.

The year 1920 opened with a rate of construction activity unprecedented for the winter season. Total contracts reached a maximum of over three hundred million dollars in the month of April. From that time on, for causes well known generally, activity declined more or less steadily to the end of the year. December contracts amounted to one hundred million dollars.

Comparing the past two years, the most conspicuous feature of 1920 was the decline in residential construction. This class of construction represented 33% of the total in the year 1919, and 22% of the total in 1920. The amount of residential floor space contracted for declined from 240,000,000 square feet in 1919 to 136,000,000 square feet in 1920.

In the amounts of money involved in 1920 contracts, industrial plants and public works and utilities both exceeded residential buildings, each representing about 23% of the year's total.

There was in 1920 an increase over 1919 in actual volume of construction of educational buildings.

In normal years the total estimated cost of contemplated or projected work reported is about 50% in excess of the total amount of contracts awarded. In 1919 the total of projected work was 68% in excess of contracts awarded; in 1920, it was 92% in excess of contracts awarded. These figures give an indication of the amount by which each of the two years has run behind its announced construction program.

Forecast for 1921

The construction industry enters the new year under conditions very similar to those that prevailed at the opening of the year 1919.

There is a considerable accumulated demand for building, and activity is very slow on account of unstabilized price conditions and hesitation on the part of prospective builders because of uncertainties of future market conditions.

At the opening of 1919 building material prices had remained, on the average, at about the same level for four months. They continued at this level during the first quarter of 1919. About April, 1919, many people were convinced that building costs would not fall, and activity increased rapidly. About two-thirds of the total of that year's activity was contracted for during the second half of the year.

It seems likely that a somewhat parallel movement may be expected in 1921. Material prices have not as yet reached the stage of stabilization they had reached at the opening of the year 1919. Apparently some further declines are to be expected. It seems likely, however, that the period of stabilization and of hesitation on the part of the buying public need not be so prolonged as it was two years ago. When costs are actually stabilized it should be more easy this time to convince the public that such is the case.

In an analysis of the present price situation, a well-known authority has stated that the upward turn in material prices will probably occur some time in 1921 and that, in consequence, building costs in 1921 will be somewhat lower than they have been in 1920 or will be in 1922 and 1923.

If that be true, then price conditions will be more favorable to building activity in 1921 than they were in 1920 or will be next year. If the public comes to believe that is the case, then a resumption of activity should be expected in 1921.

Not a few leaders in the construction industry expect a revival of construction activity in the spring, to be followed by increased activity through the summer and fall.

Awakened interest in construction activity is shown by the fact that the amount of contemplated work reported in December aggregated more than for any month since June.

A volume of construction equal to that of 1919 on a cost basis somewhere near the 1919 level may be given as the most reasonable forecast for 1921. In money this would involve about two and a half billion dollars for the twenty-five northeastern states of the country, the same as the figure for 1920, though on a cost level that should represent a volume approximately one-third greater than the 1920 volume of construction.

Should conditions develop so favorably that the full demand for construction may assert itself, the end of the year might possibly show a total of as much as three billions for the twenty-five northeastern states.

Developments of the next three months should indicate whether the year's total of construction activity is likely to be nearer to two and a half or to three billions of dollars.

In 1921, residential construction and the construction of public works and utilities may be expected to predominate over other classes of buildings.

Southwestern Portland Cement Co. Shows Increase

PAYMENT WAS made by the Southwestern Portland Cement Co., El Paso, Tex., of its regular 2 per cent quarterly dividend on preferred stock Jan. 1, 1921.

Net earnings for the year have been considerably more than enough to pay a substantial dividend on the common stock, but on account of the improvements made at an approximate cost of $800,000, the company decided to pass the ½ per cent dividend on the common stock at this time, feeling that it would be able to pay it before the end of the year.

The capacity of the plant was more than doubled last year by improvements made at the Victorville, Calif., plant.

Waste heat boilers with necessary buildings installed in the El Paso, Texas. mill last year enables the company to manufacture sufficient power to operate the entire factory from the heat escaping from the kilns and to save all fuel consumed in the power plant.

Other installations are those of a large crusher and crusher house, with additional shovel and rock cars and a new stone dryer and dryer house.

The capacity of the plant has been increased 500 barrels a day, giving it a combined capacity of at least 5,000 barrels daily for its two factories.

The president of the company is Carl Leonardt, of Los Angeles, Calif.

Co-operative Agricultural Limestone Buying

THE MARKET DIVISION of the Ohio State Farm Bureau Federation advises that plans are being perfected whereby farmers will buy agstone through the county agent, and the county agent through the market division of the State Bureau. A purchase price is likely to be negotiated on the basis of delivery of several thousand tons per month in different parts of the State. This plan will likely mean organized effort in hundreds of communities to get orders from farmers who never used agstone before. This looks like the consumer was organized. If producers are organized there may be a short cut made between the two.—Bulletin of the National Agricultural Limestone Association.

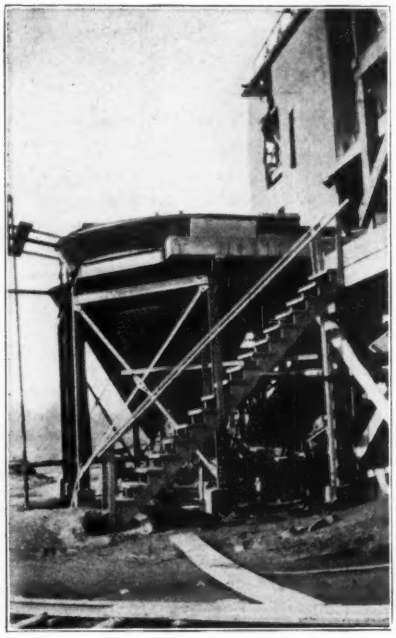
New Machinery and Equipment

Allen Cones for Recovering Fine Phosphate Sand

By E. Shaw, Engineer, Allen Cone Co., El Paso, Tex.

THE "BROWN ROCK" fields of Tennessee contain a large amount of valuable material in the form of fine phosphate sands. In some cases as much as 80% of the material mined is in this form. Much of this sand is very fine, even minus 200-mesh, and its recovery, which includes its separation from the sticky, brown, colloidal clay which accompanies it has always been one of the main problems of the industry.

Nearly two years ago, the Hoover-Mason Phosphate Co., realizing that they



Allen sand cone

were having a serious loss in the escape of these fine sands in the waste waters, asked the Allen Cone Co., of El Paso, to come into the field and study the problem. After months of work in the laboratory, and experimenting in the plant on a large scale, the engineers of the company designed a machine that they call the Allen sand-washing cone. The success of the first experimental installation of this machine was so pronounced that installations were made by the Hoover-Mason Co., the Armour Fertilizer Works and the Federal Chemical Co. The Ruhm Phosphate Co. and the International Agricultural Corporation are installing these machines at this writing.

These sand washing cones have been made in 12-, 14- and 16-foot diameters, measured at the overflow lip. The distinguishing feature of the sand-washing cone is the automatic control of the valve which admits the settled sand to the washing chamber in the apex of the cone. This control is by means of a submerged float, or "actuator," that rises and falls with changes in density of the liquid mass in the cone. This control of the valve allows the settled sand to fall by its own weight into the washing chamber without permitting clear water to escape into the main cone except in very small amount. The washed sand is discharged from the washing chamber by means of a siphon, and the water accompanying it is only tinged with clay. This discharge is de-watered in an Allen sand cone and sent to a concrete sump from which it is pumped by a centrifugal pump to the rinsing cones at the top of the plant.

The sand-washing cones recover only the finer sands; the coarser sands, are recovered by two "jet" elevators and two Allen sand cones. A ⅜-in. screen is carried at the end of the "washing can," a large cylinder fitted with angle iron lifters that beat and disintegrate the mass of clay and sand as the cylinder revolves, doing about the same work as a log-washer. In the Hoover-Mason plant this machine is run half submerged in a large wooden box, and it is the overflow from this box that goes to the sand washing cones. At the end of the "can" the coarse rock goes to a de-watering elevator, while the finer material, the undersize of the screen, falls to the bottom of the box and is lifted by the "jet" elevators to the Allen sand cones. These de-water it and let it fall into the concrete sump above mentioned.

Clean water is added at this sump and all the sand is pumped to the rinsing cones at the top of the plant. The passage through the pump and the cones rubs off any clay that may adhere to the grains of sand and this clay is carried off in the overflow of the rinsing cones. The de-watered sand from these cones is then sent to draining bins, from which it goes to the dryers. The washed sand is so clean that it will not stain the fingers when it is rubbed.

An important feature in the design of this plant is the re-use of water. Clear water that has been used for rinsing contains so little clay that it can be used for preliminary washing, and the overflows from the rinsing cones and the sand-washing cones are sent to the "washing can" to be used in that way. This keeps the pumping of water from its original source down to a low limit, and this is important as the water supply in the Mount Pleasant field is sometimes very low in the summer months.

The Hoover-Mason Co. has gone about the saving of the fine sands in a very scientific manner. A foreman has especial charge of sand recovery and not only looks after the cones but takes hourly samples of the waste waters. The sand in these samples is washed out and weighed and calculated to the tonnage of the plant so that the daily loss is accurately known and reported. In addition other facts which have a bearing on the recovery are reported, such as the percentage of clay in the water and the tonnage of material treated by the plant. The most important factor has been found

Discharging sand from cone

to be the percentage of clay held in suspension in the water. When this passes a certain well defined point the fine sand will not settle in any reasonable time. This has been worked out both in the laboratory and by plant tests and the plant is run in accordance with the result of these tests.

A DESCRIPTION of the Allen cone and the method of its operation was described in detail in a previous issue of ROCK PRODUCTS. These cones have a wide variety of uses from that of a simple sand washing and settling device to the more elaborate classification of sizes by hydraulic methods.

General Market News

Western Developments in the Rock Phosphate Industry

THE IMPORTANT DEVELOPMENTS in rock phosphate in 1920 have been in the western field. The Anaconda Copper Co. is now producing double superphosphate, making sulphuric acid from smelter fume in a Larison packed cell plant, and obtaining the rock from the company operating at Paris, Idaho. The Anaconda company has added to its phosphate rock holdings at Melrose and Garrison, Mont., a large deposit in Soda Springs Canyon, Idaho, and is assembling a large mine and milling equipment, and a railroad is being built from the main line of the Oregon Short Line at Soda Springs to its proposed workings.

The Western Phosphate Co.'s mine, about three miles from Paris, Idaho, is connected by rail with the Oregon Short Line main line at Montpelier. The rock taken from this mine is white or light gray in color and appears to be very uniform in composition, the dried rock analyzing better than 72 b.p.l. It is claimed that the vein from which this rock is taken is 6 ft. in width and it has been traced for nine miles on land owned or controlled by the company. The other rock in the western field is brown or black in color, usually harder than the Paris rock and lower in phosphorus content, although there are some very large veins much higher in phosphorus content.

The Western Phosphate Co.'s main tunnel has now been driven about 2,000 ft. on this vein. The company has established a camp with large mining facilities, has a mill for crushing and drying with a daily capacity of 350 tons, another under construction with a daily capacity of 400 tons and a fine grinding mill with a capacity of eighty tons daily. The company has been shipping continuously since April of the current year to the Middle Western States, to the Pacific Coast and to the Orient. For the latter trade large loading bins have been constructed at Portland, which has handled the bulk of the export trade. The Western Phosphate Co. is associated with the interests controlling the large high-grade deposits near Border, Wyo., and in the Crawford Mountains, Utah, the largest reserves of high-grade rock in the world. The American Phosphate Co. is working a deposit about five miles from Montpelier, Utah, and is reported to be producing about sixty tons a day with an augmented production promised at an early date, and there are several other shippers of small tonnages in the area. The total shipped from this area in 1919 was about 16,000 tons. The current year will probably see this figure quadrupled, the bulk of the material being taken from the mine at Paris, and as the black rock is rapidly winning friends as its merits become known to the trade, a steadily increasing production from this field can be expected. The long delayed but apparently now assured future of this industry will be a potent factor in developing the early manufacture and greatly increased use of mixed fertilizers in the Western States.—Frank K. Cameron, "The Outlook for the Fertilizer Industry," in "Chemical and Metallurgical Engineering."

Tariff Necessary to Protect Lime Industry in Washington

WHILE WASHINGTON LIME KILNS are idle and men are out of work, British Columbia plants operating with Chinese and Hindoo labor, paid with depreciated currency and aided by British orders in council, which give them added advantage in American markets, have taken markets away from American lime manufacturers and threatened to ruin this industry, said John S. McMillan, who established a lime industry on Puget Sound 36 years ago, speaking before the Pacific Northwest Products Committee of the Chamber of Commerce recently.

Mr. McMillan said a tariff high enough to put the American kilns on an equal basis with British Columbia plants must be put into effect if the industry is to be saved. British Columbia manufacturers employ Chinese and Hindoo labor and ship the product into Seattle and the Northwest with a 5 per cent duty on a valuation fixed by themselves, a proceeding which is a travesty, said Mr. McMillan.

The British Columbia producers collect in American money, exchange that for the depreciated Canadian exchange and pay their coolie labor on the basis of Canadian exchange. The product is shipped to the Pacific Coast states in British vessels, and Washington producers have been assured that if the present prohibitive duties, taxes and exchange features do not absolutely shut Washington lime out of British Columbia that an order in council can be secured to do the job.

Mr. McMillan said the lime industry in the Pacific Northwest was formerly a prosperous one, but during the war it received a serious blow from lack of ships, while building in this section has been slack, with the result that for the last five years many of the plants have been operating on only a 20 per cent basis.

In view of the above facts, the Seattle, Washington, Chamber of Commerce has sent telegrams to Washington, D. C., urging that immediate steps be taken to increase the tariff on lime products from British Columbia.

Imports of Magnesite Closing U. S. Plants

THE MAGNESITE plant of the American Mineral Co., Valley, Wash., was closed Jan. 1, 1921, according to newspaper reports, as was also the plant of the Northwest Magnesite Co., operating mines at Chewelah, Wash.

Howard Wierum, general manager of the American Mineral Co., is quoted as saying that importations of Austrian magnesite prevented the continued operation of the plants which were established during the war at an estimated cost of about $2,000,000. Several hundred men are employed at the Valley plant.

February Road Machinery Exhibit at Chicago

MANY MANUFACTURERS of road building machinery, road materials and highway transportation equipment are preparing to send exhibits of their products to the Twelfth National Good Roads Show to be held at the Coliseum in Chicago, February 9 to 12 next. The exposition will be one of the big features of the Eleventh American Good Roads Congress to be held in Chicago at that time in conjunction with the Eighteenth Annual Convention of the American Road Builders' Association, an organization of the public highway officials and road machinery, road materials and highway transportation men of the United States and Canada. Chicago was chosen for the Congress and Exposition this winter because of its central location and the splendid facilities afforded at the Coliseum for a successful show.

The president of the American Road Builders' Association this year is M. J. Faherty, president of the Board of Local Improvements, City of Chicago. Both Mr. Faherty and the others officers of the Association are leaving nothing undone to make the coming Exposition the most notable in the organization's history. The secretary of the Association recently spent several days in Chicago making the local arrangements in conjunction with Mr. Faherty and others. More than forty thousand square feet of floor space in Chicago's big exposition hall will be devoted to the exhibits, which, this year, owing to the tremendous increase in road building and street improvement work since the close of the war, promise to exceed in number and variety those of the expositions held at Boston, Pittsburgh and Chicago before the war. The interest manifested in the coming exposition is, even at this early stage, most unusual.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.			1.40 per net ton, all sizes			
Burlington, Vt.	1.00		2.50	2.00	2.00	
Califon, N. J.	1.80	2.25	2.00	1.80	1.80	
Chaumont, N. Y.	1.75	1.75	1.75	1.50	1.50	1.50
Coldwater, N. Y.	1.80	1.80	1.80	1.65	1.65	2.00@2.25§
Grove, Md.	1.45	2.50	2.40	2.00	1.60	1.45
North Leroy and Akron, N. Y.	.70	1.25	1.25	1.25	1.25	1.25
Redington, Pa. (dolomite)	1.35	1.85	1.85	1.85	1.85	1.85
Utica, N. Y.	1.00		All other sizes 1.50			
Vernoy, N. J.	2.00	2.25	2.00	1.80	1.60	
CENTRAL						
Alden, Ia.	1.00		1.50	1.45	1.45	
Alton, Ill.	2.25		1.85	1.75		
Bettendorf, Ia.			All sizes, 2.00 cu. yd.			
Buffalo, Ia.	.90	1.35	1.45	1.25	1.25	1.35
Chicago, Ill.	1.41	2.00	1.53	1.41	1.41	1.41
Cincinnati, Ohio		2.00	2.00	2.00		
Cleveland, Ohio		2.40	2.20	2.20		
Columbia, Ill.	2.15	1.90	2.00	2.00	1.90	1.90
Coralville, Ia.	1.25		1.65	1.50	1.40	
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*		
Dundas, Ont.	1.00	1.50	1.50	1.35	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	
Ft. Wayne, Ind.	1.60	1.90	1.90	1.80	1.60	1.60
Greencastle, Ind.	1.25@1.50	1.50	1.25	1.25	1.25	1.25
Illinois, Southern	2.25	1.75	1.75	1.75	1.50	
Kansas City, Mo.	.60	2.00				
Kokomo, Ind.	1.10	1.10	1.25	1.20	1.10	1.10
Krause or Columbia, Ill.	1.80	1.30	1.50	1.40	1.30	1.30
Lannon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.70	1.60	1.50	1.50	1.50	1.50
Linwood, Ia.	1.00		1.45	1.25	1.25	
Mansfield, Ohio	1.70	2.20	2.00	1.90	1.70	1.70
Mayville, Wis.	.95@1.00		1.20	1.20	1.20	1.20
Montrose, Ia.	1.35@1.50	1.75@1.85	1.75@1.85	1.70@1.80	1.65@1.75	
Oshkosh, Wis.			1.40 per ton, all sizes			
Ottawa or Hall, Can.	2.00	2.25	2.25	1.75	1.75	
River Rouge, Mich.	1.25	1.50	1.50	1.50	1.25	1.25
St. Louis, Mo.	.60	1.60				
Sheboygan, Wis.	1.30	1.30	1.30	1.30	1.30	1.30
Stolle, Ill. (I. C. R. R.)		1.85	1.85	1.85	1.85	1.85
Stone City, Ia.	.80		1.65	1.55	1.45	
Toledo, Ohio, f. o. b. cars	1.85	2.10	2.10	2.10	1.85	1.85
Toronto, Canada	1.75	2.40	2.40	2.40	2.15	2.15
SOUTHERN:			These prices include 90c freight			
Cartersville, Ga.	2.50	2.50	2.50	2.50	2.50	2.50
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75	1.75
Columbia, S. C.	1.00@1.25	3.50	3.50	3.50		
El Paso, Tex.	1.00	1.00	1.00	1.00		
Fort Springs, W. Va.	1.85	2.00	2.00	1.70	1.60	
Garnett, Okla.	.65		1.75	1.75	1.60	
Mascot, Tenn.		1.50	2.00		1.50@2.00	
New Braunfels, Tex.	.60	1.75	1.75	1.50	1.50	1.50
WESTERN:						
Atchison, Kans.	.50		2.10	2.10	2.10	
Blue Springs and Wymore, Neb.	.20	1.95	1.95	1.85@1.90	1.75@1.80	1.70
Kansas City, Mo.	.60	2.00				
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	
Branford, Conn.	.80	1.75	1.65	1.45	1.25	
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.60	1.40
Bound Brook, N. J.	2.50	2.75	2.25	2.10	2.10	
Dresser Jct., Wis.	.75	2.45	2.45	2.15	2.00	2.00
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	1.50
E. Summit, N. J.	2.50	3.00	2.75	2.30	2.30	
Glen Mills and Rock Hill, Pa.	1.60	1.90	1.90	2.25	2.10	1.90‖
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	
Oakland, Calif.	1.15	1.15	1.15	1.15	1.15	1.15
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	
Winchester, Mass.	1.60	.85	.85	2.10	1.85	1.60

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
W. Barre, Pa.—Quartzite	.90	1.20	1.20	1.70	1.35	1.10
Holton, and Bolingbroke, Ga.—Granite	.40		2.75	2.50	2.25	2.25
Little Falls, N. Y.—Syenite	.90	1.30	1.30	1.80	1.60	1.30
Middlebrook, Mo.—Granite	4.00		2.00	2.00		1.50‡
Ottawa, Can.—Granite	5.50	5.00	5.50	5.00		
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	
White Haven, Pa.—Sandstone	1.20	1.60	1.70	2.00	1.85	1.70

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Coldwater, N. Y.—Analysis, 56.77% $CaCo_3$, 41.74% $MgCo_3$ — 70% thru 200-mesh, 95% thru 40-mesh; bags, $5.00; bulk 3.25

Chaumont, N. Y.—Analysis: $CaCo_3$, 95%; $MgCo_3$, 1.14% — Thru 100 mesh); sacks, 4.50; bulk 2.75

Gasport, N. Y.—90% thru 50 mesh, bulk, 2.50; bags 4.25

Grove City, Pa. — Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20% —(70% thru 100 mesh); 80 lb. ppr., 5.50; bulk 4.50

Grove, Md. — (50% thru 50 mesh); paper bags, 6.50; bulk 4.50

Hillsville, Pa.—Analysis, $CaCo_3$, 96% (70% thru 100 mesh); sacks, 5.00; bulk 3.25

Jamesville, N. Y.—Analysis, $CaCo_3$, 89.25%; $MgCo_3$, 5.25%; bulk, 2.75; sacks 4.50

Syracuse, N. Y. — Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk 2.75

Walford, Pa. (50% thru 100 mesh; 60% thru 50; 100% thru 10); sacked, 5.00; bulk 3.25

West Stockbridge, Mass., Danbury, Conn., No. Pownal, Vt. — Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk 3.25

Williamsport, Pa. — Analysis, $CaCo_3$ 88-90%; $MgCo_3$, 3-4%—(50% thru 50 mesh); bulk 4.00@5.50

CENTRAL:

Alden, Ia.—Analysis, $CaCo_3$, 99.16% .80

Alton, Ill. — Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—50% thru 4 mesh 2.25

Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, equivalent 98.5% 2.00

Belleville, Ont.—Analysis, $CaCo_3$, 90.9%; $MgCo_3$, 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk 2.50

Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh 1.50

Columbia, Ill., near East St. Louis (½-in. down) 1.25@1.80

Elmhurst, Ill. — (Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh 1.25

Greencastle, Ind.—(Analysis $CaCo_3$, 98%), 50% thru 50 mesh 2.00

Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100 2.75@3.00

Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$ 2.00

Marblehead, O. — (Analysis: $CaCo_3$, 95.33%) 100% thru 100 mesh, sacks, 5.25; bulk 3.00

Mayville, Wis. — $CaCo_3$, 53.65%; $MgCo_3$, 43.72% 1.75@2.00

McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04% — 100% thru ¼-in. sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100 1.50

Milltown, Ind. — (Analysis, $CaCo_3$, 94.41%; $MgCo_3$, 2.95%); 28% thru 100 mesh; 25.2% thru 200 mesh; 34.4% thru 50 mesh 1.65

Montrose, Ia.—(90% thru 100 mesh)

Piqua, O.—Analysis: $CaCo_3$, 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%— 50% thru 100 mesh 3.50@5.50
50% thru 50 mesh 1.75@2.00

Ridgeville, Ind.—(Analysis $CaCo_3$, 98%), 100% thru 4 mesh 1.75

River Rouge, Mich.—Analysis: $CaCo_3$, 54%; $MgCo_3$, 40%; bulk .80@1.40

Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ½-in. mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82% 2.75

St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12% 1.50

Stone City, Ia.—Analysis, $CaCo_3$, 98% (50% thru 100 mesh) .80

Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen) 1.80

Whitehill, Ill. — Analysis, $CaCo_3$, 97.12%; $MgCo_3$, 2.50%—
50% thru 100 mesh 5.00
50% thru 50 mesh 2.25

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:

Cartersville, Ga.—Analysis: 96% combined carbonates—90% thru 100 mesh 3.00

Claremont, Va. (Marlime)—Analysis, 90.03% $CaCo_3$, 0.31% P., 1.36% Mg., 0.37% K.; bulk 4.50
100 lb. ppr. bags 6.00
100 lb. cloth bags 6.50

Dittlinger, Tex.—Analysis, $CaCo_3$, 99.09%; $MgCo_3$, .04%—
90% thru 100 mesh 2.00
90% thru 4 mesh 1.00

Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh.... 3.00

Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk 2.00

Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh 3.00

Linnville Falls, N. C.—Analysis, $CaCo_3$, 53%; $MgCo_3$, 42%—50% thru 100 mesh; sacks, 4.50; bulk 3.00

Marion, Va.—Analysis, 90% $CaCo_3$—(50% thru 100 mesh) 2.50

Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%); average price, ½ in. down 2.00

Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.
(80% thru 100 mesh) 3.00
(All thru 10 mesh) 2.50
(80% thru 200 mesh) 5.00
Paper bags, $1.50 extra per ton; burlap, 2.00 extra per ton.

Maxwell, Va. 2.50

Mountville, Va.—Analysis, $CaCo_3$ 76.6%; $MgCo_3$, 22.83%—100% thru 20 mesh; 100 lb. ppr., 7.00; bulk 5.50

Ocala, Fla.—Analysis, $CaCo_3$, 98%—(75% thru 200 mesh) 4.50

Tyrone, Ky.—Analysis, $CaCo_3$, 90%; $MgCo_3$, 4%—90% thru 4 mesh ..... 1.75@2.25

WESTERN:

Cement, Calif.—Analysis, $CaCo_3$, 95%; $MgCo_3$, 2%—(50% thru 50 mesh) 5.00

Colton, Calif.—Analysis: $CaCo_3$, 95%; $MgCo_3$, 1½% (all to pass 14 mesh)—bulk, 3.50; bags 4.50
Sacks, 15c extra, returnable.

Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk 2.00

Oro Grande, Calif.—Analysis: $CaCo_3$, 94%; $MgCo_3$, 2%; 85% thru 200 mesh; $4.00, bulk; bags 10.25

Terminus, Calif.—Analysis, 96.4% $CaCo_3$, 1.3% $MgCo_3$—(60% thru 200 mesh; 80% thru 100 mesh; 100% thru 50 mesh); sacks, 6.00; bulk..... 5.25

Tulsa, Okla.—90% thru 4 mesh ..... .65

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va. ..... 3.00@3.50
Bridgeton, N. J.—Washed, 2.50; dried 3.00
Cedarville and South Vineland, N. J.—Damp, 2.00; dry 2.50
Columbus, Ohio ..... 2.50@3.00
Gray Summit, Mo. ..... 2.50@4.00
Hancock, Md.—Damp 2.00
Klondike and Pacific, Mo. ..... 2.50@4.00
Leesburg, Pa.—Core, and molding coarse 3.00
Mapleton, Pa.—Dry 4.00
Glass, damp 3.00
Massillon, Ohio 3.50
Millington, Ill. ..... 2.25@3.00
Mineral Ridge, Ohio 4.00
Montoursville, Pa.—Green, washed..... 2.00@2.75
Morgantown, W. Va. ..... 3.00@3.25
Oregon, Ill.—Large contracts..... 2.00@2.50
Ottawa, Ill. 2.50
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Robinson, Md.—Washed, damp 2.00
Rockwood, Mich. ..... 3.00@4.00
Round Top, Md.—Glass and damp, $2.50; core 2.25
St. Marys, Pa.—Green 3.00
Sands, Elk Co., Pa.—Selected, green.. 2.75
Thayers, W. Va.—Washed 3.00
Tygarty, Ky.—Washed, not dried..... 2.60
Utica, Ill. ..... 1.75@2.50
Ableman, Wis.—Brass molding and molding fine 3.00

FOUNDRY SAND:

Albany, N. Y.—
Molding, fine and coarse 3.00
Brass molding 3.00
Core 1.65
Sand blast ..... 3.00@5.00
Allentown, Pa.—Core ..... 1.75@2.00
Molding coarse ..... 1.75@2.00
Arenzville, Ill.—Molding fine ..... 1.75@2.00
Beach City, Ohio—Core and glass sand 2.25@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse..... 2.25@2.50

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Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		1.30		1.30	1.00	1.00
Attica, N. Y.	.75	.75	.75	1.00	1.00	1.00
Erie, Pa.		1.00	1.15		1.25	
Farmingdale, N. J.	.48	.48			1.40	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.60@ .75	2.00	1.75	1.65	1.50
Ludlow, Mass.	.75*	.75*	1.70		1.50*	1.50*
Pittsburgh, Pa.		1.30@1.50			1.00	1.00
Washington, D. C.	.75	.75	2.00	1.40	1.20	1.20
York, Pa.		1.10@1.30	(crushed gravel)			
CENTRAL:						
Alton, Ill.	.60@ 75	.60@ 75	1.50@4.50	1.30	1.20	1.20
Attica and Covington, Ind.	1.00	1.00	1.00	1.25	1.25	1.25
Anson, Wis.		.60				1.00
Barton, Wis.	.70	.70				.70
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, O., and vicinity	1.20	1.15	1.15	1.15	1.15	2.00
Columbus, O.		.70@1.25	1.10@1.25	.80@1.25	.80@1.25	.70
Des Moines, Ia.	.75@1.00	.75	1.75	1.75	1.75	1.75
Detroit, Mich.		.70		.85 (64/40)		.95
Earlestead (Flint), Mich.	.60	.70		1.05	.95	.95
Eau Claire, Wis.	.40@ .50	.50@ .60	1.00@1.25		1.00@1.10	
Elgin, Ill.		.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.75	.60	1.00	.84	.84	.84
Grand Rapids, Mich.		.60		.90	.85	.85
Greenville, Mechanicsburg, O.	.80	.70	.80	1.00	.85	.80
Humboldt, Ia.	1.00	.85	1.90	1.90	1.90	1.90
Indianapolis, Ind.	.60	.60		1.50	.75	.75
Janesville, Wis.		.80@ .95			.85@ .95	
Lincoln, Neb.	Sand .80, sand and gravel 1.30, drained for shipment					
Mason City, Ia.	1.00	.90	2.00	1.85	1.85	1.75
Milwaukee, Wis.	1.55	1.55	1.60	1.60	1.60	1.60
Minneapolis, Minn.	.50	.50	2.00	2.00	1.75	1.50
Moline, Ill.	1.30	1.30	1.60	1.60	1.60	1.60
Pittsburgh, Pa.		1.30	1.30		1.00	1.00
Riton, Wis.		.85				.85@1.00
St. Louis, Mo., f. o. b. cars	1.95	1.65	1.95	1.65	1.60	1.60
Summit Grove, Clinton, Ind.	1.00	1.00	1.00	1.00	1.00	1.25
Terre Haute, Ind.	1.00	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	.75	.75				
Winnipeg, Can.	All sizes 1.20					
Yorkville, Moronts, Oregon and Sheridan, Ill.	.90	.90	.90	.90	.90	.85
SOUTHERN:						
Flomaton, Ala.		1.00		2.25		
Ft. Worth, Tex.	2.00@2.25*	2.00@2.25*	2.75@3.00*	2.75@3.00*	2.75@3.00*	
Greenville, Miss.		1.10				1.00
Jedburg, Mo.		1.05	1.20@1.45	1.00	1.00	.95
Knoxville, Tenn.	1.25	1.25	1.65	1.65	1.65	1.50
Lake Weir, Fla.		.75				
Macon, Ga.		.75@1.00				
Memphis, Tenn.	1.40	1.40	1.50			1.50
N. Martinsville, W. Va.		1.40				1.20
New Orleans, La.	1.00		1.75		1.25	
Pelzer, S. C.	.90					
Pine Bluff, Ark.	1.25	.92	Washed gravel, all sizes, 2.10			
Tulsa, Okla.		.70				
Waco, Texas	.70@ .80	.70@ .80				
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Porteau, B. C.	1.30	1.30	1.30			1.20
Pueblo, Colo.	.95	.90				2.00
Roseburg, Ore.	2.00	1.75	2.00	1.75	1.75	1.75
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.25@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Seattle, Wash.	1.25	1.25	2.00	1.25	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel 2 inch and less
EASTERN:						
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Glenville, N. Y.				1.00*		
Hartford, Conn.		1.00*				
Yardville, N. J.		.50@ .75				
York, Pa.		1.00@1.30	(crushed rock sand)			
CENTRAL:						
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.85	.85	.85	.85	.85	.85
Cherokee, Hawarden, Ia.	.80 per ton—1.20 washed					
Elkhart Lake, Wis.	.90 per ton (washed concrete material)					
Ft. Jefferson, Mechanicsb'g, O.	.70	.60	.60			
Hersey, Mich.	.60			.60	.60	
Janesville, Wis.		.65			.75	
Oxford, Mich.						.85@ .95
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo., f. o. b. cars						1.75
Summit Grove, Ind.	.65	.65	.65	.65	.65	.65
Yorkville, Oregon, Moronts and Sheridan, Ill.						.80@ .90
SOUTHERN:						
Albany, Ga.	.70@1.00					
Dudley, Ky. (Crushed Sand)		1.15		1.10		
Lindsay, Tex.					.60	
Valde Rouge, La.						.60@ .75
Waco, Texas		.80		1.50		1.30
WESTERN:						
Roseburg, Ore.	1.75	1.50	1.75	1.50	1.50	1.50
Saratoga, San Jose, Calif.		60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70

*Cubic yard. B Bank. L Lake. ‖ Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Buffalo, N. Y.	2.35	1.35	1.35	1.35	1.10@1.35	1.35	1.35
E. Canaan, Conn.	3.50	1.10	1.10	1.35	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.50	.90	1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpsville and Struthers, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.50	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, $1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton, Jackson, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	2.20	1.70	1.95	1.95	1.95	1.70	1.70
Youngstown, Dover, Hubbard and Leetonia, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	2.50	1.00		1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.		7.50@8.00	72		
Bellefonte, Pa.	10.50		98.8	.72	
Berkeley, R. I.			50	18	15.00
Branchton, Pa.		5.50			
Cassadaga, N. Y.—Marlime	8.00	10.00	92.36	1.08	
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	10.50		45.50	30.50	13.00
Chippewa, Pa.	6.00@6.50		78.67	1.33	
Farnams, Mass.	5.00	6.50	60	2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove, Md.	8.00				10.75
Highgate Springs, Vt.	6.00		85	2	8.00
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kiln, Md.	9.50	13.50			13.50
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Mt. Union, Pa.	6.25		93.69		
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang and Lemoyne, Pa.	4.00@6.00		60	12	
Rosendale, N. Y.	8.00	9.00	92	5	
Union Bridge, Md.	11.00	5.50	73	1	13.00
Williamsport, Pa.	6.25	12.00	84-87	2-3	12.00
West Rutland, Vt.	5.00	8.00	68	3	
West Stockbridge, Mass.	3.35	5.35			12.00
York, Pa.	10.75	13.00	92	5	13.00
CENTRAL:					
Alton and Hannibal, Ill.	11.50		95		
Delaware, O.			50.0	5-12	11.50
Knowles and Valders, Wis.	4.00	9.00	55	45	13.00
Manistique, Mich.	11.00		95	2	11.00
Marblehead, O.			54	16	13.00
Mitchell, Ind.					13.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Woodville, Ohio			47.50	31.60	8.00@12.00
SOUTHERN:					
Blowers, Fla.	5.50		98		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Claremont, Va. (Marl.)	5.00	7.00	85-95	2-5	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	10.00		97.82	0.12	
Knoxville, Tenn.	12.00		98.5	.05	15.00
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	6.50		84		6.50
Newala, Ala.	10.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	8.00	10.50	85	10	
WESTERN:					
Colton, Calif.			97	2	15.00
Kirtland, N. Mex.	12.00				
San Francisco, Calif.		15.00	97	0.33	15.00
Tehachapi, Cal.	6.00	8.00	96	2	
Orofino, Idaho	6.50	8.57	95	2.16	

Miscellaneous Sands

(Continued from preceding page)

Bowmantown, Pa.—Core 1.35@1.50
Molding, coarse 1.80
Bridgeton, N. J.—Core 2.00
Cleveland, O.—Molding coarse 1.50@2.00
Brass molding 1.50@2.00
Molding fine 1.50@2.00
Core 1.25@1.50
Columbus, O.—Core 1.00@3.00
Brass molding 3.50@4.00
Glass sand 3.00
Molding fine and coarse 3.00
Conneaut, O.—Molding fine 2.25@2.50
Molding coarse 2.00@2.25
Delaware, N. J.—Molding fine 2.00
Molding, coarse 1.90
Brass Molding 2.15
Eau Claire, Wis.—Core .70
Sand blast 3.25@3.75
Fleetwood, Pa.—Furnace lining 2.25
Franklin, Pa.—Traction 2.25
Brass molding 2.50
Core 3.00
Molding fine 3.00
Molding coarse 3.00
Sand blast 5.00
Greenville, Ill.—Molding coarse 2.00@2.25
Hancock, Md.—Core and brass mldg. 1.65
Hellam, Pa.—Core 2.00@2.50
Joplin, Mo.—Stone sawing, flint 1.25
Kansas City, Mo.—Missouri River core .80
Klondike and Gray Summit, Mo.—Molding fine 2.00@3.00
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp 2.50
Core, furnace lining, moulding, fine and coarse, dry 3.00
Massillon, O.—Molding fine 4.00
Core and molding, coarse 3.50
Glass sand 4.00
Traction 3.50
Furnace lining 4.00
Michigan City, Ind.—Core, bank .75
Millington, Ill.—Glass and core 2.25
Core sand 2.25
Furnace lining 2.50
Roofing sand 2.25
Stone sawing 2.25
Mineral Ridge, O.—Core, molding sand blast, roofing, etc., washed, screened (damp) 3.25
Montoursville, Pa.—Core and traction 1.50@2.00
Brass molding 1.75@2.25
Glass sand 2.00@2.75
New Lexington, O.—Molding fine 4.25
Molding coarse 3.25
Oregon, Ill.—Core, furnace lining, molding fine and coarse 2.25@2.75
Sand blast 3.50
Ottawa, Ill.—Crude silica sand 1.25@1.75
Ottawa, Ill.—Core, furnace lining, steel molding 2.50
Sand blast 5.00
Glass sand 2.00@2.50
Roofing sand 3.50@5.00
Ridgeway, Pa.—Glass sand, green 2.25
Glass sand, wash 2.50
Molding, fine and coarse 1.20
St. Peter, Minn.—Glass sand 2.25
Core sand 2.25
Brass molding 2.25
Molding fine 2.25
Rockwood, Mich.—Glass sand, core, roofing, stone sawing 3.50@4.00
Sand blast 3.50@4.00
Thayer, Pa.—Traction 2.25
Furnace lining 1.40
Molding fine and coarse 1.25@1.50
Core, steel 2.50@3.00
Tygarty, Ky.—Core and stone sawing 2.60
Fire-brick sand, washed but not dried 2.15@2.40
Utica, Pa.—Core 3.00
Molding fine 3.00
Molding coarse, traction 3.00
Brass molding 3.00
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry) 2.75
Same, green 2.50
Wedron, Ill.—Core (crude silica) 1.25
Molding fine 1.50
Furnace lining 1.50
West Albany, N. Y.—Molding fine 2.50
Molding coarse 2.50
Brass molding 2.50
Zanesville, Ohio—Molding fine and brass 2.50@3.00
Molding coarse 2.25@2.50

Crushed Gypsum

Castalia, O.—Crushed, to cement mills 4.50
Ft. Dodge, Ia.—Bulk 4.00@5.00
Grand Rapids, Mich.—Crushed gypsum rock 4.00
Gypsumville, Man., Can.—Crushed 3.50
Oakfield, N. Y. 4.00
Gypsum, O., and Akron, N. Y. 4.50@5.50
Saltville, Va. **4.50**

(Gypsum) Land Plaster

Castalia, O.—Land plaster 6.80
Bags extra—Jute, 3.00; ppr., 1.00.
Garhutt, N. Y.—Land plaster, bags 8.00
Bags extra
Grand Rapids, Mich.—Ground gypsum rock 5.00
Mound House, Nev.—Ground gypsum rock 7.50@8.00
Sacks, .25 extra
Oakfield, N. Y.—Ground Gypsum rock 8.00
Plasterco, Tex. 12.00
Sandusky, O. 6.00
Jute, 3.00 extra; ppr., 1.00 extra.
Los Angeles, Calif. 12.40@14.40

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh) 9.00@10.00
Lump rock, 72% to 75%, B. P. L. 6.00@8.50
Centerville, Tenn.—B. P. L., 65% 8.25
B. P. L., 70% 9.00@10.00
Brown rock, 75% and better 12.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60% 6.00
B. P. L., 65% 7.00@9.50
B. P. L., 70% 9.50
B. P. L., 72% 9.50
B. P. L., 75% 12.00
Lump rock, long ton, 65-70% 7.00@9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%) 7.50@9.00
13% phosphorus 8.00
14% phosphorus 10.00
Mt. Pleasant, Tenn.—B. P. L., 70%
Norwills, Fla.—Fla. Hard Rock (B. P. L., 68%) **10.00**
Wales, Tenn.—(B. P. L., 70%) 8.25

Florida Soft Phosphate

Bartow, Fla.—B. P. L., 60%, bulk 10.00
Croon, Fla.—Ground pebble, 30% 16.00
Pulverized soft, 26% 17.50
Jacksonville (Fla.) District 10.00@12.00
(Add 2.50 for sacks)
Norwills, Fla.—B. P. L., 60%, bulk 10.00
Phoslime, Fla. (in burlap bags) 15.00
Morriston, Fla. (24% phosphoric acid) 16.00

Portland Cement

Current warehouse prices, carload lots at principal cities, without bags:

New York (del.)	$3 50
Jersey City (del.)	3.20
Boston	3.41
Chicago	2.37
Pittsburgh	2.42
Cleveland	2.73
Detroit	2.78
Indianapolis	2.61
Toledo	2.71
Milwaukee	2.59
Duluth	2.35
Peoria	2.63
Cedar Rapids	2.71
Davenport	2.67
St. Louis	3.45
San Francisco	3.09
New Orleans	4.20
Minneapolis	3.00
Denver	3.25
Kansas City	2.76
Seattle	3.03
Dallas	3.85
Atlanta	3.00
Cincinnati	3.32
Los Angeles	3.10
Baltimore (del.)	2.93
Montreal (including bags)	

NOTE—Bag charge is generally 25c each.

Natural Cement

Current price for 500 bbl. or over, f.o.b., exclusive of bags:

	Current
Minneapolis (Rosendale)	$1.85
Kansas City (Ft. Scott)	1.60
New Orleans	3.36
Atlanta (Magnolia)	1.90
Cincinnati (Louisville)	2.75
Boston (Rosendale)	2.35

Roofing Slate

The following prices are per square (100 sq. ft.) for slate, f. o. b. cars, quarries, Bangor, Penn.

No. 1 Clear Slate

Sizes	Price
24x14	10.85
24x12	10.85
22x12	11.55
22x11	11.55
20x12	11.55
20x10	12.60
18x12	11.90
18x10	12.60
18x 9	12.60
16x12	11.90
16x10	12.60
16x 9	12.60
16x 8	12.60
14x10	11.90
14x 8	11.90
14x 7	11.20
12x10	11.20
12x 8	11.20
12x 7	11.20
12x 6	11.20
10x 8	9.10
10x 7	9.10
10x 6	9.10

No. 2 Clear

24x12	8.75
22x11	8.75
20x10	9.45
18x10	9.45
18x 9	9.45
16x 8	9.10
14x10	9.10
14x 8	9.10

No. 1 Odd Sizes

18x18	13.30
16x16	13.30
14x14	13.30
12x12	13.30

The following are the prices per square for slate, f.o.b. cars quarries, Granville, N. Y., the prices given in each case being for No. 1 Sea Green Roofing Slate:

22x11, 20x12, 20x11, 20x10, 18x12, 18x10, 18x9, 16x12, 16x10	11.90
16x12, 16x10	11.90
24x12, 22x12, 16x9, 16x8, 14x12, 14x10	11.55
26x14, 24x14, 22x14, 20x14	11.20
14x9, 14x8, 12x10	10.50
14x7, 12x9, 12x8	9.80
12x7, 11x8, 11x7, 10x8	9.10
12x6, 10x7	8.40

Granulated slate per net ton, f. o. b. quarries, Vermont and New York, 7.50@12.00.

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finished	Hydrate per Ton Common
New York	$21.00	$20.00
Kansas City	27.20	26.20
Chicago	20.00	.....
St. Louis	27.00	21.00
Boston	28.00	27.00
Dallas	.....	25.00
Cincinnati	18.20	17.20
San Francisco	25.40	22.00
Minneapolis	28.00 (white)	24.00
Denver	32.00	.....
Detroit	22.00	19.00
Seattle	27.01	.....
Los Angeles	2.75†	2.20†
Baltimore	24.00 (East)	.....
Montreal	25.00	25.00
Atlanta	.....	23.50
New Orleans	24.50	24.50

	Lump per 200-lb. Barrel Finished	Common
New York	$ 3.80 at plant	$ 3.60*
Kansas City	2.50	2.40
Chicago	.....	1.65
St. Louis	.....	2.75
Boston	.....	3.95†
Dallas	.....	2.50†
Cincinnati	.....	2.10‡
San Francisco	.....	2.25
Minneapolis	2.10	1.80
Denver	1.05 (bu.)	.....
Detroit	2.00†	1.80†
Seattle	2.85†	.....
Los Angeles	2.75†	2.00†
Baltimore	.....	13.00‡
Montreal	15.00‡	15.00‡
Atlanta	3.00†	2.75†
New Orleans	3.00	2.85

*300-lb. barrels. †Per 180-lb. barrel. ‡Per ton.
NOTE—Refund of 10c per barrel with 25c per ton off on hydrated.

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubes	60.00
Blanks, per lb.	.08
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	3.50
Ground talc (20-50 mesh), bags	8.75
Ground talc (150-200 mesh), bags	11.25@13.50
Chester, Vt. — Ground talc (150-200 mesh), bulk, 10.50@12.00; bags	12.00@14.00
Chatsworth, Ga.—Crude talc	**8.00@10.00**
Ground talc (150-200 mesh), bags	**12.50**
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk (Bags extra)	8.50@10.00
Ground talc (150-200 mesh), bulk (Bags extra)	10.00@22.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk (Bags extra)	8.50
Ground talc (150-200 mesh), bulk, 10@15.00 and (Bags extra)	10.00@15.00
Pencils and steel workers' crayons, per gross	**2.00**
Biltmore, N. C.—Ground talc (150-200 mesh), 200-lb. bags	15.00@30.00
Pencils and steel workers' crayons, per gross, 1.25@1.45 and	1.55@ 1.60
School crayons, per gross	1.15@ 1.20
Roller mill crayons, per gross	1.75@ 1.90
Keeler, Calif.—Ground talc (150-200 mesh), bags (Bags extra)	18.00@40.00
Gouverneur, N. Y.—Crude talc	4.25
Ground talc (150-300 mesh)	17.00@24.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk	8.50
Bags	10.00
Ground talc (150-200 mesh), bulk	10.00
Bags	21.00
Los Angeles, Calif.—Ground talc (20-50 mesh) 200-lb. bags	12.00
Ground talc (150-200 mesh) 200-lb. bags	20.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	16.00@20.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Michigan City, Ind.	14.00
Milwaukee, Wis. (delivered at job)	18.50
Barton, Wis.	15.00
South Dayton, Ohio	16.50
Albany, Ga.	16.00
Brighton, N. Y.	20.50
Buffalo, N. Y.	16.50
Winnipeg, Can. (less $1 trade disc.)	19.00
Boston, Mass.	19.00@21.00
Syracuse, N. Y. (delivered at job)	27.00
F o b. cars, plant	25.50
Washington, D. C.	15.50
San Antonio, Texas—Common	18.00@22.00
Face	25.00@32.00
Boise, Idaho (in yard)	18.00
El Paso, Texas	16.00
Rochester, Mich.	13.00
Bloomfield, Ont., Can.	18.00
Plant City, Fla.	17.00
Grand Rapids, Mich.	15.00
Lancaster, N. Y.	16.50
Portage, Wis.—Common	18.00@20.00
Face	30.00@35.00
Toronto, Can.	17.00

New York Dealers Cut Cement Price—Plaster Slightly Less

PRICE REDUCTIONS in cement, finishing plaster and expanded metal lath are reported for the week ending January 8 by the Dow Service Daily Building Reports.

The reduction in cement is a dealers' cut of 30 cents a barrel on the delivered price and reflects no disturbance in the manufacturers' price that has been ruling for the last three weeks. The cut is ascribed to a desire on the part of distributors in this market to unload some of the stock purchased under contract in 1920 and meets the forecast made in this column a fortnight ago. Incidentally the lower price was expected to help hasten the starting of projects being deferred, in anticipation of more acceptable price ranges, by prospective builders.

The change downward in the price of finishing plaster applies to barrel lots only and while it originates at manufacturing points, it is due entirely to the lowering in the cost of cooperage or barrelling material such as staves, hoops and heads. In every other respect the price situation in the finishing plaster department remains unchanged. The price change as it affects the purchaser of this material totals 30 cents a barrel in his favor.

The heaviest kind of pressure has been exerted in the building industry to bend the building material and equipment price levels, but up to the present there has been no general evidence outside of common brick, linseed oil and a few items in lumber, which went to excessive price altitudes during and immediately following the war, of sweeping general price slashes in building materials.

Investigation, investment ostracism and even money pressure in the form of frozen bank credits have not been wholly adequate to put building material prices back to pre-war levels at which the prospective builder sets his mark as a condition of his proceeding at once with construction. While some price reductions have taken place, almost as many other items have advanced as demand is beginning to take the place of inactivity.

General Market News

Great Need of Skilled Labor in the Building Trades

SENATOR WILLIAM M. CALDER, of New York, chairman of the Committee on Reconstruction and Production, has sent a letter to the governor of every state urging action to increase the supply of skilled workmen in the building industries. Senator Calder writes:

"A comprehensive study of the causes of the present shortage in housing and of the various factors entering into the building industry which have tended to retard its progress has been conducted by this committee during the past eight months, and although we have not been able to visit every state in the Union, we have covered all which the time at our disposal has permitted, and have interrogated authorities from all over the country in order to give a national scope to the study. Our investigation has enabled us, as a result of the perspective thus afforded, to ascertain some of the things which will remedy the conditions which are unsatisfactory and which hamper reconstruction.

"One of the outstanding factors which is now hampering the building industry is the curtailment at the source of supply of skilled tradesmen. The building industry is more highly organized than any other large industry, but it is noticeable everywhere that its members are now getting along in years and in some trades the skilled young man is a rarity. It has been the experience of the past that the skilled mechanic in the building trades drops out very much earlier than in other trades and is forced to take up other or less skillful employment. His pay has accordingly been somewhat higher than the usual run, but the necessity for constant replacement has been ever present.

"The American youth takes kindly to the particular trades which require a little more skill than others, and so we find among the electricians, the plumbers and the masons numerous young men of American birth, but such is not the case with the other trades. Heretofore men from foreign shores, dissatisfied with the political and social conditions existing in their fatherland, have come to this country and, without serving a technical apprenticeship, they have started at the bottom of the ladder in the building trades. Those who have been worthy have risen to heights limited only by their ability. The country was a huge industrial training school where the building trades were taught largely to newcomers to our shores, but the ravages of war cut off this source of supply and the result is apparent on every hand. The remedy seems plain—more apprentices. This goes to the essence, for without apprentices we shall soon be short of journeymen not only but of foremen and practical employers. The problem is, how shall this be achieved? The best solution seems to be through the fostering of building trades schools. Some of the states have, under their labor codes, authorized a State Industrial Commission to operate an apprentice department."

More Gravel Used in Indiana Road Construction

MORE LOCAL gravel may be used in roads constructed by the Indiana highway department as the result of an increase in the percentage of sand which the department will permit to go into the concrete mixture. Heretofore in the coarse aggregate gravel part of a cement mixture the sand was not permitted to exceed 5 per cent of the whole. The limit has been increased to 10 per cent by L. H. Wright, director of the department.

Chicago Savings Banks Make Big Gains in Deposits

THE SPIRIT OF THRIFT that is sweeping the country is evidenced by great increases in saving banks deposits—which means more money for real estate loans and undoubtedly presages a general home-building boom. According to Arthur M. Evans in the Chicago "Tribune":

"An absorbing story is tucked away in the dry statistics of Chicago's banks. Despite unemployment, the volume of savings accounts is growing. The increase has been most rapid since the slump in industry really clamped on its hooks.

"The figures show that during the last six or seven weeks of 1920 savings deposits in Chicago banks grew at a rate 85 per cent greater than during the first forty-six weeks of the year.

"When the year's business closed savings depositors had in the banks $491,500,000, as against $387,000,000 twelve months before. It was an increase of $104,500,000 for the year, or about 26.7 per cent.

"But the surprising feature is that the greatest rate of growth occurred after Nov. 15, about the time Chicago, which has not been hit nearly as hard as eastern industrial centers, really began to feel the sag."

New $130,000 Tripoli Plant at Lincolnville, Okla.

A MODERN TRIPOLI plant, the estimated cost of which is $130,000, is to be erected by the National Tripoli Co. on a site lying between Lincolnville, Okla., and the Missouri-Kansas line, according to an announcement made by T. A. Smith, president of the company.

The company is incorporated for $300,000, and its main offices will be located in Joplin, Mo.

Construction work on the plant, which will manufacture tripoli flour will be started early in January, and it is estimated that about three months will be required in completing it. It will have a daily capacity of 100 tons.

The company has leases on 253 acres of land in northeast Oklahoma, lying on a line directly west of Seneca, Mo., tripoli field, which at present is the only one in the world producing this product. It has been proved up, and according to Mr. Smith, contains huge bodies of tripoli of a high grade which will keep the plant running for an indefinite number of years.

Shafts have been sunk on various parts of the acreage and a mill site blocked out.

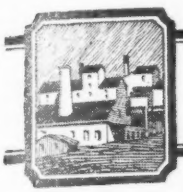
Tripoli has a large variety of uses in the commercial world, and at present is selling at $40 a ton, more than the price being paid for zinc ore. It has been shipped to all parts of the country from the Seneca field, and even England is a heavy user of the Southwest Missouri product.

Indiana Road Tax on Trucks Held Unconstitutional

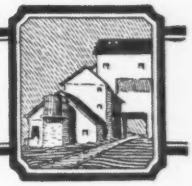
A RULING of unusual importance was handed down by Judge James A. Collins, of the Criminal Court in Indianapolis recently when he ruled that the road tax law as applied to trucks in Indiana was unconstitutional. The ruling will save the sand and gravel industry several hundred dollars extra taxation on its trucks. The law was passed at the last regular session of the legislature and provided a tax of $6.70 per ton capacity on trucks in addition to other taxes. A test case was made when one of the most prominent transfer men of Indianapolis got himself arrested and was tried in city court. He was acquitted, but the state appealed the case to the criminal court.

South Dakota May Have Cement Plant

THE action of the state commission of South Dakota in taking options on a site for a cement plant at Rapid City indicates the possible location of such plant to be erected by the state. On one of these sites a building has been started and material and machinery located. Hydroelectric power is available at these locations and the fuel situation is favorable.



News of the Industry



Incorporations

Beldam Asbestos (Canada) Co., Toronto, Can., has filed articles of incorporation.

Clarkson Cement Brick and Tile Co., Toronto, Can., has filed articles of incorporation.

The Lautz-Missouri Marble Co., Carthage, Mo., has filed articles of incorporation placing its capitalization at $75,000.

The Western Granite, Marble and Stone Co., Saskatoon, Sask., Can., has been incorporated for $20,000.

Pebble Rock Fertilizer Co., Hickman County, Tenn., has been incorporated for $25,000 by J. D. Deen, H. McCord, John Marsh, G. L. Bell and W. C. Shaw.

The Pier Lumber Co., Wausau, Wis., has been incorporated for $50,000 to deal in lumber, cement, sand, stone, etc., by C. C. Pier, G. R. Wilson and E. C. Dawley.

The Piedra Rock Co., a California concern has been incorporated for $280,000 by F. T. Smith and R. Capocelli, both of Santa Fe, and E. M. Prince of Berkeley, Calif.

The Golden Gravel Co., Wilmington, Del., has been incorporated for $50,000 to deal in sand, gravel, etc., by C. T. Cohee, C. B. Outten, and S. L. Mackey, all of Wilmington.

The Great Lakes Corp., 69 Wisconsin St., Milwaukee, Wis., has been incorporated to deal in building materials of all kinds by W. E. Westphal, S. Kucaynski and T. B. Kucaynski.

The Ballard Realty Co., Sioux Falls, S. D., has been incorporated for $25,000 to own, operate and maintain stores, shops, quarries, etc., by L. W. Ballard, C. C. Cone and M. I. Ballard, all of Sioux Falls.

Hagernille Quarries, Ltd., St. Thomas, has been incorporated with a capital of $100,000 by F. B. Marble and F. Palma, Detroit; W. E. Rowe and A. A. Ingram, St. Thomas, and F. D. Marble of Ravenna, Ohio, to manage quarries.

The Ballard Monument Co., Sioux Falls, S. D., has been incorporated for $100,000 to own, lease, operate and maintain in the city of Sioux Falls, or elsewhere, shops, plants, quarries, etc., by L. W. Ballard, O. T. Anderson and Wm. D. Meyer, all of Sioux Falls.

The Lillie Granite Co., Montpelier, Vt., has been incorporated for $100,000 by D. K. Lillie, E. R. Tarbox, F. W. Bancroft and E. D. Bancroft, Jr. The company takes over the business conducted by Mr. Lillie as an individual and the incorporators are all men identified with business in the past.

Sand and Gravel

The Central Sand and Gravel Co., Seattle, Wash., announces change of office to Rooms No. 1202-1204 American Bank Bldg., Second Ave. and Madison St., Seattle, Wash., on and after Jan. 5, 1921.

The Corliss Sand Co., New Martinsville, W. Va., has been merged with the New Martinsville Sand Co., under the latter name. The consolidated company will operate with a capital of $150,000.

The Pittsburgh Sand and Gravel Co., Joplin, Mo., will increase its production through the establishment of a new crushing plant and the employment of an additional force of sixty-five men, according to an announcement by E. E. Maxwell, general manager of the company.

Louisville, Ky.—Work will start shortly on rebuilding the sand and gravel elevator of the Nugent Sand Co., at Louisville, burned in November, and which is used in hoisting river sand and gravel from river barges to the company's elevator and yards. Work hasn't been started as yet due to slow delivery of special timbers and material. In the meantime the company is handling from good stocks on its yards, by means of portable loaders, hand loading, etc. The loss, which was about $13,000, was covered by insurance, but the principal loss has been in delay, although it came at a very dull season. This company, along with the other river companies, has quit digging sand for the year, and placed its boats, barges, etc., in the Portland Canal, or in the chute back of Towhead Island, where they are safe from high water and running ice.

Baltimore, Md.—Applications for receiverships have recently been made by creditors of the Bolton Brothers Stone Co., Franklin Road, and the Builders' Sand & Gravel Co., both of Baltimore, Md.

The Silica Sand Co., Mount Holly Springs, Pa., recently fired a blast that loosened an estimated amount of 15,000 tons of sand for working. Three tons of dynamite were placed in seven holes, each about 65 feet in depth.

Amite, La.—Extensive dredging work is under way in the Tangipahoa district, near Amite, La., for sand and gravel production, and increased operations are planned. Three companies are now operating here, the New Orleans Gravel Co., and the Jahncke Co., both of New Orleans, and the State Gravel Co., Alexandria, La. Suction dredges are being employed, with screens for separating the sand from the gravel. The production is being used primarily for construction purposes.

The Texas Sand and Gravel Co., Waco, Tex., has been organized to take over the operation of a plant designed and installed by T. J. Palm, about six years ago. During the past three years this plant, at Texand, Texas, has been operated by the Potts Moore Gravel Co. The plant will be improved and other equipment added and the output will be considerably increased. L. D. Eastland is president of the company, T. J. Palm, vice-president and manager and W. D. Eastland, secretary-treasurer.

The Rock Island Sand and Gravel Co., Rock Island, Ill., proposes an expenditure of about $60,000 in construction of a gravel screening plant next year. The announcement was made recently by H. J. Larkin, manager. The plant will have a capacity of 500 to 600 cubic yards of gravel and will be located on the Mississippi river front, south of Twenty-first Avenue, Rock Island. Fifty-three acres of land, known as part of the O. J. Dimick estate, recently passed to the gravel company at the point where the base of operations will be. Consideration was in excess of $30,000. The land is said to hold a gravel bed of great value.

Quarries

The Climax Stone Co., Bedford, Ind., has filed a preliminary certificate of dissolution.

The Salida Granite Corp., Salida, Colo., sliced a large melon for its stockholders Christmas, declaring a 25 per cent dividend, 8 per cent in cash and 17 per cent in additional stock. The company reorganized less than a year ago with $100,000 capitalization, and has flourished.

Carthage, Mo.—Reorganization of the Carthage Quarry Co., increasing the capital stock to $200,000 and changing the name to the F. W. Steadley & Co., was perfected recently at a stockholders' meeting. According to an announcement made following the meeting the change in name is made principally to avoid confusion with other quarries in correspondence, which has been experienced in the past. The Carthage Quarry Co. will continue as an organization. The business and management of the new company will remain the same.

The Keasbey & Mattison Co., Ambler, Pa., manufacturer of asbestos and magnesia products, has acquired limestone properties at Whitemarsh, Pa., forming part of the Wentz tract, known as "Hope Lodge." It is proposed to open up a portion of the property at an early date, with the installation of quarrying and general operating machinery. The production will be utilized at the company's plant at Ambler in connection with magnesia manufacture. A number of years ago, the Whitemarsh district was a prominent limestone section, but of late it has not been worked to any great extent.

The Brinton Minerals Corp., Christianburg, Va., recently formed with a capital of $600,000 is planning for the development of extensive silica and limestone properties. The company has a tract of about 1000 acres of silica sand lands, 25 acres of limestone properties, as well as extensive acreage of feldspar properties. Complete plants will be installed for operation, with equipment to include jaw and gyratory crushers, air compressors, air drills, conveyor systems, storage buildings, etc., as well as an electric power plant for general service. Caleb R. Brinton is president and general manager, and will also act as consulting engineer for the company.

The Blue Limestone Co., Minneapolis, Minn., announces change of name to John Wunder Co., sand and gravel.

The Kampeska Materials Co., 103 North Main Ave., Sioux Falls, S. D., announce that plans have been completed and work under way for the remodeling and installation of new equipment in their quartzite quarry at West Sioux Falls, S. D. The quarry is being equipped for the production of the smaller sizes of crushed quartzite, for bithulithic and asphaltic concrete paving, roofing stone and especially for stone for stucco finishing. The material is of a reddish tan and free from rust producing minerals. Production will begin about Feb. 15th.

Lime

The Elora White Lime Co., Ltd., Elora, Ont., has surrendered its charter.

The Kimbalton Lime Co., Kimbalton, Va., has increased its capitalization from $50,000 to $75,000. S. C. Shead is secretary.

Sovereign Lime Works, Ltd., Montreal, has been incorporated with a capital of $20,000 to manufacture and deal in lime and crushed stone.

Bellefonte, Pa.—A part of the new hydrating plant of the American Lime and Stone Co. has been placed in operation here. It will be several years before the entire plant is completed but when finished it will be one of the best industries in this section.

The Dominion White Lime Co., Ltd., Windsor, Ont., has been incorporated with a capital of $100,000 to quarry limestone and manufacture limestone products. The incorporators include H. Bernstein and J. Becker of Windsor, I. Taylor of Toronto, and B. Hurwitz of Ford, Ont.

Cement

The Missouri Portland Cement Co., International Life Building, St. Louis, Mo., is planning for the installation of a new dust reduction system at its different mills, estimated to cost in excess of $80,000.

Stroh, Ind.—An explosion of coal dust in the coal room of the Wabash Portland Cement plant at Stroh, Ind., blew all the windows out of the building and did considerable damage to the building. The explosion was caused when the chief electrician and his assistant entered the coal room to make repairs on an electric starter. A short circuit caused a flash that exploded the coal dust. The assistant was almost instantly killed and the chief electrician is not expected to live. Four other men were seriously burned. This is the first serious dust explosion reported in Indiana for some time.

The Louisville Cement Co., Louisville, Ky., has announced plans for doubling the capacity of its old natural cement plant at Speeds, Ind., a plant which is over fifty years of age. The old plant at one time had a capacity of 3,500 barrels a day, but much of the capacity was changed over to Portland cement, when that grade became popular. In late years the company has developed a big demand for "Brixment," a bricklayers' cement, used instead of mortar, and today its production of 1,000 barrels of natural cement daily is not sufficient to take care of its needs, with the result, that natural cement production is to be increased to 2,000 barrels daily. The bricklayers' cement is a compound of natural cement and other ingredients.

Gypsum Products

The Ralph Gypsum Co., LeRoy, N. Y., is planning for the extensive development of its local properties, as well as at Byron and Stafford. Test holes are being driven and mining equipment will be installed at an early date.

The Wheeling Wall Plaster Co., Wheeling, W. Va., has increased its capital stock to $250,000, $200,000 of which is common stock and $50,000 preferred. The increase will provide for enlarging operations. The company is planning to build a large dock on the Ohio river for the purpose of repairing barges and boats they own. The dock will cost $250,000.

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Situations Wanted

WANTED

Position as quarry superintendent, by married man, age 43, who has worked his way up from the bottom and knows quarry business from A to Z. Large plant preferred. Results guaranteed. Thoroughly understand all makes of crushers, also have operated steam shovels for 5 years. Am employed at present but can give good reasons for making change. Services will be available about Feb. 15th or March 1st. Have had 16 years' experience in this particular line. Can prove my qualifications by practical work.

Box 1457 **Care Rock Products**

Superintendent

With 20 years' experience quarry and general excavation work, thoroughly familiar with operation and up-keep of crushing plants, well hole drilling and blasting and steam shovel operation. References. Address

Box 1454 **Care Rock Products**

Help Wanted

Superintendent Wanted

With experience and thoroughly familiar with operations and up-keep of a stone crushing plant, well hole drilling and blasting. Capacity 500 tons per day. Plant is run by electricity. Address

Ky. River Stone & Sand Co.
Lawrenceburg, Ky.

Plant for Sale

Parties interested in buying a gravel proposition in Iowa, where quality and quantity are almost unlimited and where location and facilities are unexcelled, will do well to write **Box 1459, care of Rock Products**, for further information.

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

Miscellaneous

Old established eastern manufacturing company desires to increase their manufacturing activities and is looking for a patented machine or specialty to manufacture. Prefer something closely allied to the Cement, Rock Crushing or Fertilizer Industry. Give complete particulars with first communication. Address

Box 1455 **Care of Rock Products**

FOR SALE

Finely powdered coke running from 85% to 90% fixed carbon. Amount available about 125 tons per month. For further particulars address

American Cyanamid Company
Niagara Falls, Ontario, Canada

For prompt and satisfactory results in buying or selling a plant securing help or a position, use the Classified Department of ROCK PRODUCTS

USED EQUIPMENT

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

FOR SALE

8 and 9 K CRUSHERS
Regular drive. Guaranteed.
75 H.P. FLORY ELEC. HOIST
440 V. 60 Cy. 3 Ph. A. C. slip ring motor
ROSS POWER EQUIP. CO.
Indianapolis, Ind.

FOR SALE

Wagon Loader, Jeffrey Type A-5 Gasoline Self Propelling. Practically new and in perfect condition.
2—Robins Belt Conveyors, Complete with idlers, drives and 20" belts. New.

JOSEPH L. HILLER
21 S. 12th St. **Philadelphia, Pa.**

FOR SALE

One second hand No. 5 Good Roads Crusher, with opening 11"x26", in excellent condition; a real bargain to a quick buyer. Address

Box 1453 **Care of Rock Products**

USED EQUIPMENT

Locomotives for Rent or Sale

2—50-ton 18x24 in. six-wheel switchers.
1—40-ton 17x24 in. four-wheel switcher.
1—40-ton Vulcan four-driver saddle-tank.
2—18-ton and 14-ton 36-in. gauge Vulcans.
2—10-ton 7x12 in. 36-in. gauge Vulcans.
1—10-ton 36-in. gauge Shay geared.

Miscellaneous

1—Marion 35 steam shovel on traction wheels.
1—Marion 76 steam shovel, No. 3503.
1—Lidgerwood dragline, 60-ft. boom, 2-yd. bucket.
100—60,000-lb. capacity box cars, 40-ft. long.
40—60,000-lb. capacity flat cars, 36-ft. long.
13—6-yd. dump cars, 4-ft. 8½-in. gauge.
12—1½-yd. "V" steel dump cars, 36-in. gauge.
1—Western standard gauge spreader.
2-in., 4-in., and 6-in. simple, duplex, and centrifugal pumps, 10 H.P. and 45 H.P. upright boilers, tripod drills, etc.

LOCOMOTIVE CRANES, RAILWAY EQUIPMENT, etc.

INDUSTRIAL EQUIPMENT CO.
McCormick Building, Chicago, Ill.

HOIST ENGINE

One New Hoist 9"x12" double Cyls. double drum, with or without NEW A. S. M. E. boiler. Both cheap.

CRUSHERS

One No. 6 and one No. 7½ McCully Gyratory Crushers. Perfect condition.

A. J. O'NEILL CO.
Weightman Building Philadelphia, Pa.

FOR SALE

No. 7½ McCully Rock Crusher, complete, ready for immediate installation. Also extra parts.

CHICAGO UNION LIME WORKS CO.
1900 West 19th Street Chicago, Illinois

WANTED

15 standard gauge quarry cars, 2½ to 3 cu. yd. capacity. Give all particulars and furnish sketch with your reply.

INLAND CRUSHED STONE CO.
139 North Clark Street Chicago, Ill.

FOR SALE

FULLER MILL, 42" Standard, fan discharge, belt driven type. Practically new, immediate delivery. LOCOMOTIVE, 18 ton, 10x16 Porter 36" gauge saddle tank in good operative condition. Address

Box 1450 Care of Rock Products

FOR SALE

No. 1 Sturtevant Ring Roll Pulverizer.
9"x18" Climax Jaw Crusher.
75 h.p. Erie City Steam Engine.
125 h.p. Atlas Steam Engine.
12"x12" Lidgerwood Standard Cableway Engine.
44" diam. by 26' long Rotary Dryer.
600 lineal feet 1⅜" Roebling wire rope.
100 h.p. 60 cycle, 550 volts, F&M Motor, never used.
100 K.W. 60 cycle, 550 volts, F&M Generator, never used.

Address E. W. Cooper, Engineer
2010 Locke Ave., Nashville, Tenn.

Immediate Delivery

No. 8 and 9 GATES CRUSHERS, REG. DRIVE.
2—150 H.P. 125 lbs. H. R. T. boilers, butt strap.
4 No. 6 Gates (Mang. Fit) nickel steel shafts.
1 No. 7½ and 1 No. 8 Gates reg. drive.
No. 4 Telsmith Plant, A.C. motor drive.
Air compressors (steam-belt) 50 to 4,000 ft.
40 boilers, 60-150 H.P., 100-130 lbs.
25—60 and 100 H.P. Ver. boilers.
4 NEW No. 4 Gates, Mang. Fit., $2,000 each.
10 coils Roebling ⅝-in. traction cable (used).
3-bag Koehring paver, practically new.
Type "O" ¾-yd. Thew steam shovel.
50, 25, 20, 15 and 125 KW. eng. and turbos.
2—60-in. EDISON ROLL CRUSHERS.
2—156 Kva. 125 V. dir. cur. eng. set, $800.00.
75 H.P. Elec. Hoist A.C. motor.

Send us your inquiries—Pumps, Steam and Electric Equipment, etc.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

Want dipper stick for 70-ton Bucyrus Shovel. State price and where same can be inspected.

Rensselaer Quarry Company, Inc.
Brainard Station, N. Y.

WANTED

No. 6 Gyratory Gates Crusher, regular drive.

Box 1458 Care Rock Products

FOR SALE

2—No. 18 Gates K Gyratory Crushers with elevators and screen; complete; first class; immediate delivery. Also twenty other sizes.

J. F. DONAHOO CO.
Birmingham, Ala.

New—RAILS—Relaying

All sections on hand for quick shipment Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa

WANTED

Sand-Lime Brick Machinery. Would consider taking over entire plant. Must be in good working condition.

W. P. MOORE
Box 392 San Antonio, Texas

FOR SALE

100 H.P. Locomotive Fire Box Boiler, 125 lbs.
100 H.P. Vertical Boiler, 100 lbs.
1—No. 8 Good Roads Jaw Crusher on skids, with 40-ft. Jeffrey chain bucket elevator.
1—No. 9 Good Roads Jaw Crusher mounted on wheels, with 14-ft. bucket elevator.
1—36" Symons Disk Crusher.

The Carmichael Gravel Company
Rialto Building, St. Louis, Mo.

WANTED

One 36x60 Jaw Crusher, or larger. One No. 18 Style K Gyratory Crusher, or approximately its equivalent. Give full particulars and state lowest cash price in first letter.

Georgia Cement & Stone Co.
314-315 Healey Bldg. Atlanta, Ga.

For Sale or Trade

Marion 60 steam shovel, excellent condition, for Marion 36 revolving traction or similar capacity shovel of other make.

Price Stone & Lime Company
Gibson Station, Va.

Sand Lime Brick Machinery for Sale

1 Hardening Cylinder, capacity 20,000 brick.
1 Eight mold American Clay Machinery Co. Rotary Press.
1 Wet Pan.

All the above are in excellent condition; situated near New York City.

Box 1456 Care of Rock Products

FOR SALE

One steel derrick sand plant complete with 85-ft. boom, 1 3-yard Monigan drag line, 65-ft. boom; 1 12x12 Lidgerwood 3-drum cableway engine; 3 mine hoists.

Contractors' Equipment Company
1010 Kansas Ave., K. C., Kas.

FOR SALE

One Allis-Chalmers No. 4 "K" Stone Crusher in good condition; also one 10x10 Blaisdale Air Compressor.

The Cedarville Lime Company
Cedarville, Ohio

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

USED EQUIPMENT

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos. 1999, 2059, 2130

1—Model 1 Thew, on railroad trucks, ⅞-yard dipper.

1—Bucyrus Model 70-C, Shop No. 1219.

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Locomotives

8—18-ton, 10x16" Porter Dinkeys, 36" gauge.
2—12-ton, 9x14" Porter Dinkeys, 36" gauge.
1—17x24", 55-ton, 4-6-0, standard gauge.
3—25-ton Forney type.

Clam Shell Buckets

1—1¼-yard Williams Hercules Bucket.

Cars

30—Western Air Dump 12-yard, standard gauge.
40—Western 4-yard, 36" gauge, steel beam.

H. KLEINHANS COMPANY
Union Arcade **Pittsburgh, Pa.**

FOR SALE

2—13-ton Standard-gauge Whitcomb Gasoline Locomotives.
1—Class "G" Ingersoll-Rand Air Compressor, 925-ft.
1—Class "H" Ingersoll-Rand Air Compressor, 342-ft.
1—Aerial Tramway System, 1100-ft. centers, with 12 buckets and carriers, 2650 ft. ¾ in. pulling cable, with 1¾ in. and 1¼ in. carrying cable, with sheaves, counterweight equipment, 65 H. P. motor and speed reduction gears complete.
1—Model G Marion Shovel, 2 yd. dipper, standard railroad trucks, excellent condition; price right.

THE CASPARIS STONE CO.
Columbus, Ohio

AUSTIN GYRATORY CRUSHERS

2—No. 2, Standard Drive
1—No. 3, Standard Drive
1—No. 5, Standard Drive
1—No. 5, Angle Drive
1—No. 6, Standard Drive
1—No. 7½, Standard Drive

These are a few specials that we wish to move quickly. We also have Crushers of other makes and sizes, also Jaw Crushers, Elevators, Screens, Conveyors, Cranes, Locomotives, Cars, Rail, Hoists and other machinery such as you use. Write us fully, and if you have excess plant, also mention what it is.

Reading Engineering Co., Inc.
1227 Tribune Bldg. New York, N. Y.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½ x25′, 4x30′, 5½x50′ 6x50′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 3½x25′, 5x60′ and 6x70′, 6x100′, 7x80′ and 8x110′.

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